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THE AMERICAN JOURNAL OF ROENTGENOLOGY

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VOL. II FEBRUARY, 1915 No. 4

ROENTGENOLOGY OF THE ACCESSORY NASAL SINUSES DESCRIBING A MODIFICATION OF THE OCCIPITO-FRONTAL POSITION

By CHARLES A. WATERS, M. D., and CARL W. WALDRON, M. B., D. D. S.,
Baltimore, Maryland

(From the departments of Actinography and Laryngology of the Johns Hopkins Hospital)

The study of diseases of the accessory nasal sinuses is not complete without Roentgen ray examination of all the sinuses from time to time, and the greatest difficulty in making diagnoses of sinusitis from the Roentgenogram has been due to the fact that the maxillary sinus and posterior ethmoid cells were always partly obscured by superimposed shadows of the petrous portions of the temporal bones.

The object of this paper is to show a modification in technique in making Roentgenograms of the accessory nasal sinuses whereby a greater efficiency in both diagnosis and treatment is gained.

The occipito-frontal position in Roentgenography of the nasal sinuses was first brought out by Caldwell in America, and Kielian of Freiburg, Germany, but since the publication of their work, many various and modified methods of procedure have been tried with varying degrees of success.

At present the same position appears to be the one generally in vogue and it is to a slight modification in this position that we wish to call attention.

It is possible with this slight alteration in technique to show clearly Roentgenograms of the frontal and maxillary sinuses, the anterior and posterior ethmoid cells on the same plate without obscuring the antra outline by shadows of the petrous portions of the temporal bones.

An important factor in making Roentgenograms of the nasal sinuses, is being exact in each individual case and intimately associating one's self with the "style" of head with which one is dealing—that is, the conformation of the skull in different individuals in relation to the course of Reid's base line.

We have classified two distinct types, namely, the concave and convex shaped face, although the only difference in technique is a variation of an angle of 2 degrees in the vertical axis of the skull.

The patient is placed face down on a horizontal table with the chin resting on the cassette holding the plate and intensifying screen. A compression diaphragm 18 c.m. in depth is screwed down tightly upon the occiput with a felt pad 2 c.m. thick interposed (Fig. 1).

Fig. 2 is a diagrammatic key to Fig. 1. Approximately an angle of 45 degrees is formed by the vertical axis of the head with the plate, but as this is difficult to obtain, we have discarded the point as unnecessary. It will be shown that only three rules are

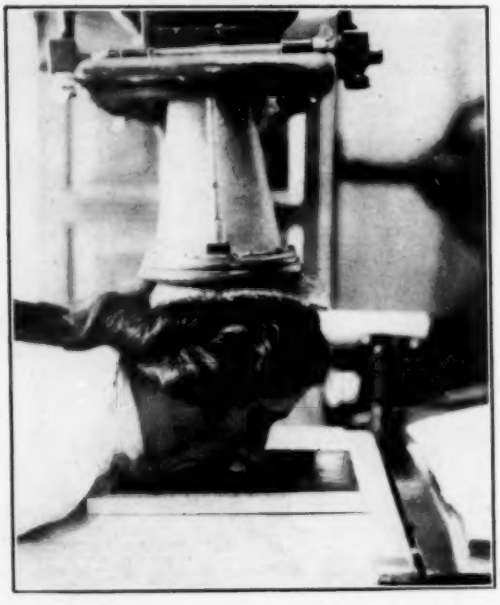


FIGURE 1—Shows patient in position for Roentgen examination of sinuses.

essential in order to obtain Roentgenograms of this region as described.

First—The chin must rest on the plate.

Second—The long axis of the tube must be parallel to the plate.

Third—The nose of the patient should be from 1 c.m. to 1.5 c.m. from the plate. Under no condition should the nose touch the plate.

The importance of knowing which style of head one is taking is readily seen by the fact that in people with concave shaped faces the course of the base of the skull is quite high, necessitating an increase of ½ c.m. in the distance of the nose from the plate. Thus the nose in this type of head is roughly 1.5 c.m. distance from the plate, while in the convex shaped face the nose is placed only 1 c.m. away with the long axis of the tube still remaining parallel to the plate.

Therefore, it is the distance of the tip of the nose from the plate with the anode of the tube parallel to it that enables one to make Roentgenograms of the accessory nasal sinuses without projecting the shadows of structures of the base of the skull and petrous portions of the temporal bones into the maxillary antra.

In order to obtain the greatest amount of detail, soft tubes with intensifying screens, a moderate amount of milli-amperage, should be employed.

An antero-posterior view of a living subject is shown in Fig. 3, of which Fig. 4 is a diagrammatic key. The upper border of the shadow formed by the petrous portions of the temporal bones is seen projected almost to the level of the floors of the maxillary sinuses. The orbits are well defined and are bisected horizontally by the upper margins of the lesser wings of the sphenoid. In the centre, the nasal cavity is divided vertically by the osseous septum, and the lower border of the nasal shadow is formed by the anterior border of the palatal process of the superior maxilla. Above the nasal septum

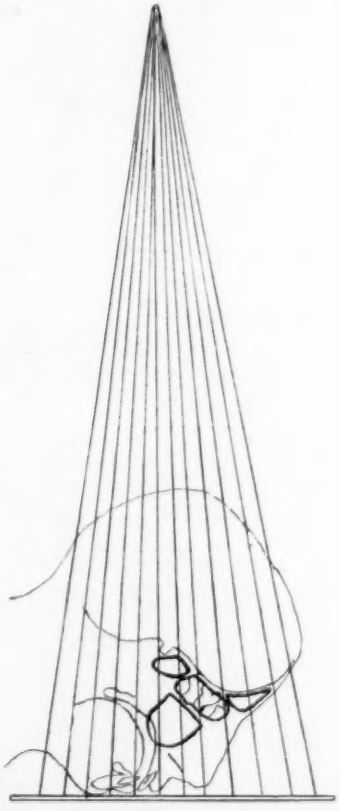
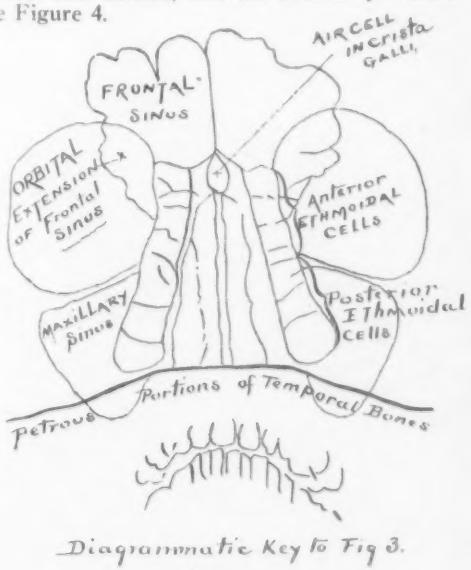


FIGURE 2—Showing the projection of the rays upon the plate in the antero-position plane.

FIGURE 3—NORMAL ADULT SINUSES—Male aet. 30. The Frontal Sinuses are large and show orbital extensions. The anterior and posterior ethmoidal cells are well defined, and the Maxillary Sinuses well developed. There is an air cell in the crista galli, see Figure 4.

is seen the crista galli, which contains an air cell. The division between the frontal sinuses is well defined. The shadows formed by the posterior ends of the middle turbinates are superimposed over those of the anterior portions of the inferior turbinates.

THE FRONTAL SINUSES: By our technique, the forehead is some 4 to 5 centimeters above the screen, as is shown in Figs. 1 and 2. This, however, does not produce appreciable distortion nor impairment of definition of the frontal sinuses. Figs. 5 and 6 are of the same patient taken in both positions. The variation in size is but slight,



Diagrammatic Key to Fig 3.

FIGURE 4.

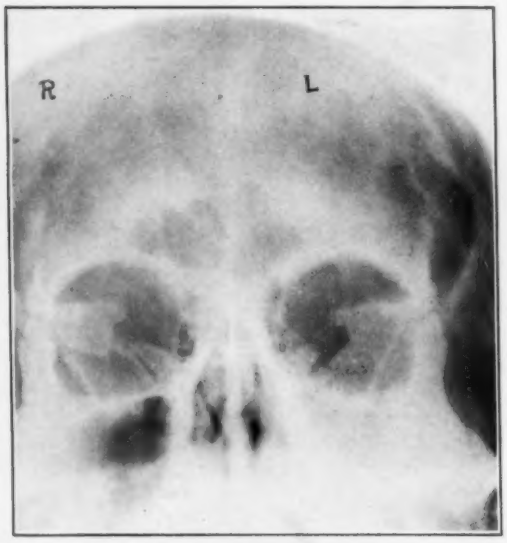


FIGURE 5—CHRONIC SUPPURATION OF THE LEFT MAXILLARY SINUS—Adult male aet. 27. There had been an acute infection one year previous, which had been followed by foul nasal discharge, headaches and pain in the left side of face.

FIGURE 7—CHRONIC SUPPURATION OF RIGHT MAXILLARY SINUS—Adult male. Following a severe nasal cold, there was foul discharge from right side of nose, severe pain in right side of face and forehead, general malaise. Large masses of cystic polypoid mucous membrane were removed from the affected sinus.

FIGURE 6—ROENTGENOGRAM OF THE SAME PATIENT AS FIGURE 5—Taken six months after large masses of diseased polypoid mucous membrane had been removed at operation. The persistence of the clouding of the sinus in the absence of any subjective or objective signs of infection is difficult of explanation. The size and definition of the Frontal Sinuses in the two plates may be compared. The position in Figure 5 was about midway between the old and new positions.

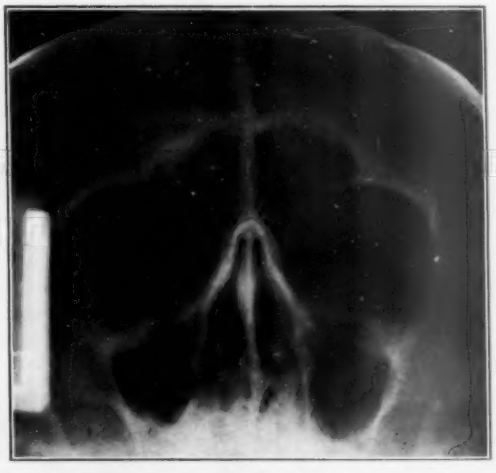


FIGURE 8—TAKEN TWO YEARS AFTER OPERATION WITH COMPLETE RELIEF OF SYMPTOMS. The Maxillary Sinus looks quite normal in the Roentgenogram. These may be compared with Figures 5 and 6. The slight variation in size of the Frontal Sinuses without impairment of definition may be seen.

FIGURE 9—CHRONIC SUPPURATION OF RIGHT MAXILLARY SINUS—Male aet. 28. Had severe asthmatic attacks for six months, discharge into throat, but no headaches. A large amount of purulent discharge was irrigated from the sinus.

being less than 3 millimeters. See also Figs. 7 and 8. The position, size, limits, and the presence of septa with recesses, may readily be determined. Orbital extensions of the frontal sinus are not determined by the presence of a lighter area at the base of the sinus, but are seen in the upper portions of the orbits. See Figs. 3 and 16.

THE ETHMOIDAL CELLS: The position of the posterior ethmoidal cells on the plate was determined in the following manner: clips of silver wire were applied to different portions of the middle turbinates before the Roentgenograms were taken. In skulls and cadaver heads, clips were also applied as well as bismuth paste forced into the cells of the posterior group. In addition, thin bismuth paste was painted upon the orbital surface of the ethmoidal labyrinth in skulls, and it was found that the shadows of the ethmoidal cells extend downward and somewhat laterally, almost to the level of the nasal floor. This is well shown in Fig. 3, the ethmoidal cells being well developed and very distinct. Extensions of the ethmoidal cells above the roof of the orbit may be determined as well as the relation of the anterior ethmoidal cells to the floor of the frontal sinus.

THE MAXILLARY SINUSES: In the examination of a large number of sinus plates, we found that marked inequalities in size and variations in position of the maxillary sinuses are met with moderate frequency. We feel that it is of great advantage to prevent the obscuring of the maxillary sinuses by the shadows of the petrous portions of the temporal bones. This is especially true of cases with infection of both maxillary sinuses with unequal amounts of polypoid mucous membrane and discharge. Skillern[1] states that absolutely no reliance can be placed on the character of the sinus secretions as an indication of the pathological condition of the sinus mucosa. In our experience, the inflammatory changes of the mucous membrane constitute the most important factor in the production of the clouding of the plates. Second Roentgenograms following the washing out of large amounts of pus from maxillary sinuses have shown but slight diminution in the intensity of the clouding of the affected sinuses.

FIGURE 10—CHRONIC SUPPURATION OF RIGHT FRONTAL AND OF BOTH MAXILLARY SINUSES—Adult aet. 52. There had been chronic nasal discharge for many years, obstinate constipation and loss of weight. Irrigation demonstrated large amounts of purulent discharge, and at operation large masses of polypoid mucous membrane were removed.

[1]Skillern—The Accessory Sinuses of the Nose.

FIGURE 11 — NORMAL SINUSES — Child aet. 9. Has had frontal headaches and considerable discharge from the nose. Examination showed a large mass of adenoids, hypertrophied turbinates with septum deflection.

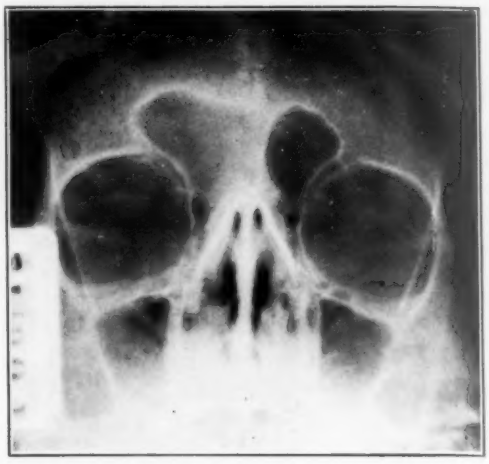


FIGURE 13 — CHRONIC SUPPURATION OF RIGHT FRONTAL SINUS. This patient complained of discharge from the right side of the nose. Formerly he was subject to right frontal headaches. A small polyp could be seen at the region of the orifice of the right fronto-nasal duct.

FIGURE 12—CHRONIC INFECTION OF BOTH MAXILLARY SINUSES IN A CHILD AET. 6. A history was given of frequent nasal colds. Examination of nose not as suggestive of Sinusitis as in child of Figure 11. Puncture and irrigation of Maxillary Sinuses revealed thick muco-purulent discharge.

FIGURE 14—ACUTE POLYSINUSITIS, RIGHT. DURATION 2 WEEKS. Following a nasal cold, there was obstruction and profuse discharge from the right side of the nose, together with severe pain over the right eye and right frontal headaches. A large amount of pus was obtained from the right Maxillary Sinus.

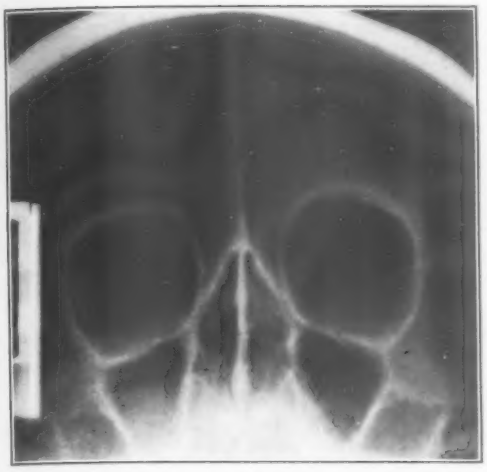


FIGURE 15—Sinuses of an adult female showing a well defined polyp or mucocele in the right Maxillary Sinus.

We have seen large masses of polypoid mucous membrane removed at radical operations upon the maxillary sinuses in cases in which previous antrum puncture and irrigation of the affected sinus had been negative. On the other hand, post-operative Roentgenograms have in some instances been most disappointing. The Roentgenograms of some patients with subjective relief of all symptoms and objectively no signs of infection both by visual examination and irrigation, show a definite clouding of the previously infected sinus. See Figs. 5 and 6. We have been unable to explain this condition, yet we are sure that all of the diseased mucous membrane was removed at time of operation and that a clinical cure has resulted in the respective cases. Others will show a complete clearing up of the affected sinus following the operation. See Figs. 7 and 8.

In children, the sinuses may be quite small and the definition consequently less distinct. Sinus infections in children have been met rather frequently, and diagnosis is usually somewhat difficult. The Roentgenogram is of great service in such conditions, and its interpretation is less difficult when the maxillary sinuses are not obscured.

This method has been employed in the last 1000 cases and we are firmly convinced of its superiority from a diagnostic standpoint.

We wish to thank Drs. F. H. Baetjer and S. J. Crowe for many helpful suggestions and for the opportunity of studying the cases clinically and at time of operation.

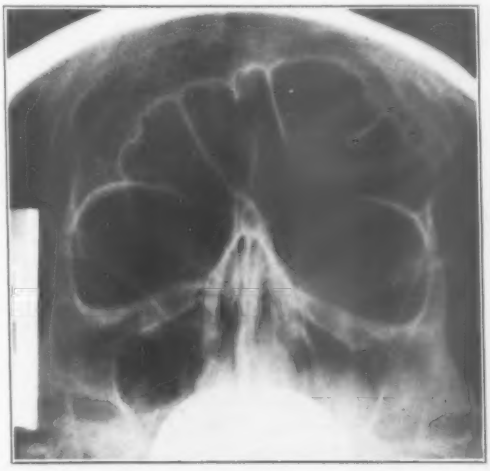


FIGURE 16—Shows a similar condition in the left Maxillary Sinus. The Frontal Sinuses are well developed and show marked asymmetry in size, the presence of orbital extensions and the abnormal position of the septum between the frontal sinuses

THE DETECTION OF PURE CHOLESTERINE GALL-STONES BY THE ROENTGEN RAYS

By DR. LEWIS GREGORY COLE, New York City

It is "safe and sane" to make a positive diagnosis of gall-stones when they are composed of calcium, or have such a definite calcareous coating or nucleus that they show as distinctly as those illustrated below.

Fig. No. 1 represents sections from real roentgenograms of the living subjects.

Stones like these have occasionally been detected roentgenographically since the rays were first discovered, but were found so infrequently that no systematic attempt was made to show them until three or four years ago.

The demonstration of a group of indistinct gall-stones by George at the last American Roentgen Ray Society meeting, stimulated me to an unusual effort in this line of diagnosis. A careful study of radio-

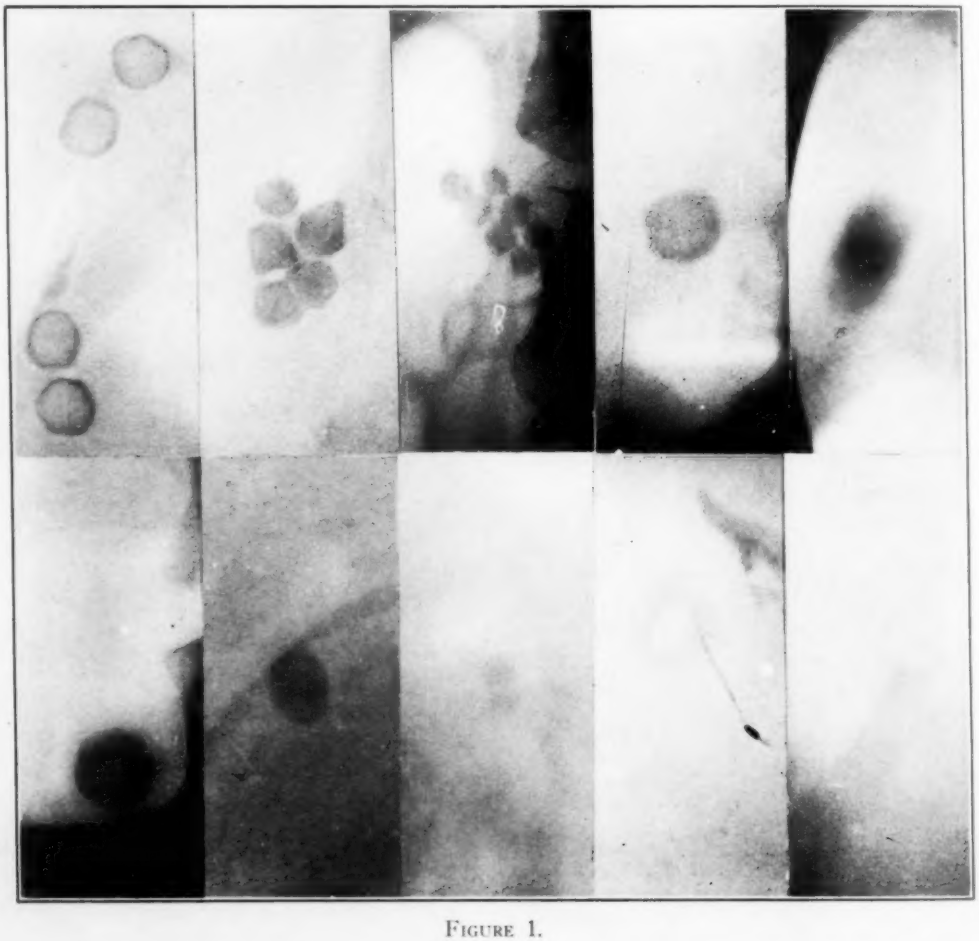


FIGURE 1.

FIGURE 2A.

grams made by the technique described in the previous communication* by George and Cole, enabled us to detect gall-stones in a far greater number of cases than had been supposed possible, although with the additional detail in the roentgenograms there were added difficulties in the interpretation of the findings.

Gall-stones from seventy-five cases were placed at my disposal through the courtesy of Dr. John Erdman. A study of thirty of these taken at random, together with a few freshly removed stones, forms the basis of the present communication.

Immediately before this investigation I had been fortunate enough to obtain a roentgenogram of a dilated gall-bladder in a case that had been referred to me for a kidney examination. After a careful study of radiograms of the gall-bladder region I made a diagnosis of an unusually dilated gall-bladder probably containing calculi. But it was not until several days later while

* The Negative and Positive Diagnosis of Gall-stones by Improved Roentgenological Methods. Cole and George. Boston Med. and Surg. Jour., March 4, 1915.

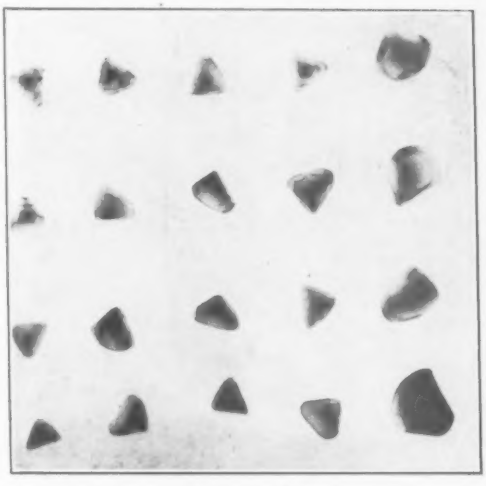


FIGURE 2B.

I was examining the plate with George that he called my attention to the characteristic markings in the gall-bladder region.

Fig. 2A is a reproduction of the roentgenogram showing the stones in situ.

Fig. 2B is a roentgenogram showing a few of the most distinct stones after removal, surrounded by air.

Fig. 2C is a roentgenogram showing some stones submerged in water.

These stones show a slight trace of calcium coating but they certainly could not be included in the "safe and sane" class of gall-stones.

From these, one characteristic calculus, which will be designated as the "Keystone" was selected as a standard of comparison, and the whole value of this investi-

FIGURE 2C.

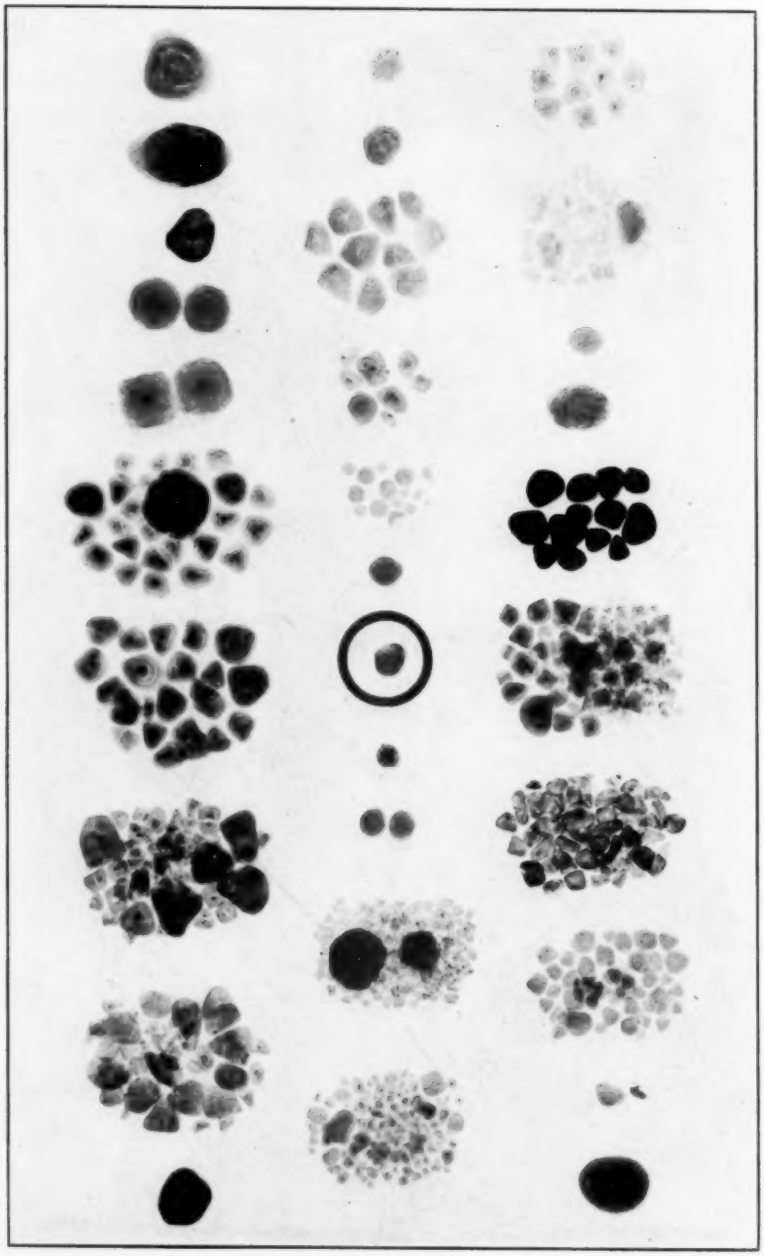


FIGURE 3.

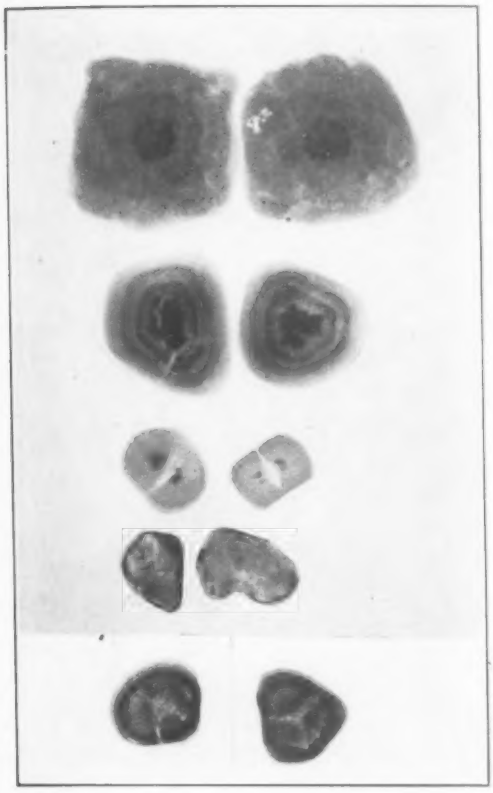


FIGURE 4.

gation depends on the comparing of the density of stones of every case with this stone which we knew could barely be shown in the living subject.

In the first test, stones from each case were placed on a plate and an exposure made. (Fig. No. 3.)

The "Key-stone" is in the center within the ring. The remarkable similarity in the distribution of the calcium in all the stones of the same case is worthy of note. That is, if one of the stones has a calcareous nucleus all of that case do, or if a stone has a calcareous coating the other stones of the same case have it also.

Two stones each from five different cases magnified to show the distribution of the calcareous deposit will illustrate this. (Fig. No. 4.) The calcareous deposit indicates the various periods of growth of the stone in the same manner that strata in the earth indicate different geological periods.

A study of such calcareous deposits, interspersed with specimens of the cholesterine deposit, compared with a perfect clinical history might be of great interest and perhaps throw some light on the cause and growth of gall-stones.

Fig. No. 5 illustrates graphically the small percentage of stones that have a sufficient calcium deposit to show like those in Fig. 1. Twenty per cent of the stones had a calcareous deposit in the form of a coating or a nucleus which rendered them more dense to the roentgen rays than the "Key-stone." These were arranged on the top line. The "Key-stone" was placed on a line

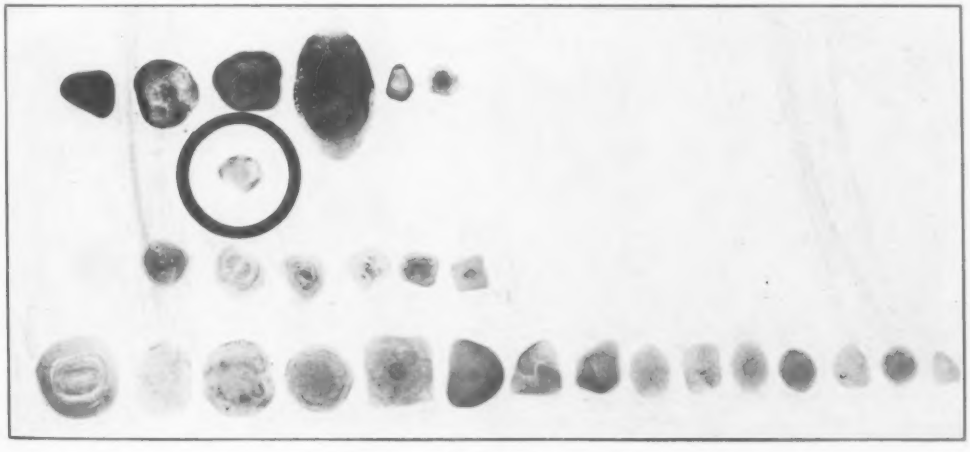


FIGURE 5.

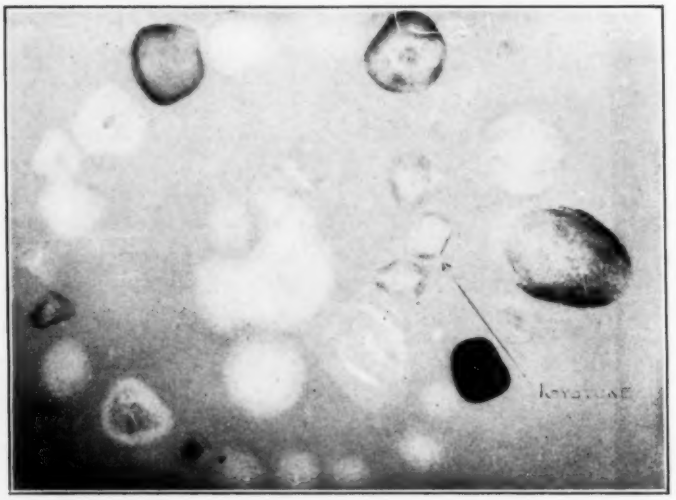


FIGURE 6.

by itself. Twenty-four per cent of the stones had a trace of calcium but less than the "Key-stone." Fifty-six per cent showed practically no calcareous deposit. These were arranged on the bottom line.

The same stones were then submerged in bile contained in a thin paper box, but as some sank and others floated they could not be arranged in the same order as in the previous plate. (Fig. No. 6.)

The six stones containing as much or more calcium than the "Key-stone" were of greater density to the X-Ray than the surrounding bile, and the sixteen stones that had practically no calcium gave a negative shadow, or less of a shadow than the bile in which they were submerged. This observation at first seemed to preclude the hope of a positive diagnosis in more than about twenty-five per cent of the cases of gall-stones.

It was suggested that as these stones had been removed for some time they might have dried out. To meet this criticism, we succeeded in obtaining several fresh specimens of gall-bladder containing stones and bile, and these were radiographed within two hours of their removal. They were placed beside the "Key-stone" and a roentgenogram was made; but this showed the gall-bladder compared with air and therefore to demonstrate the density of gall-bladder and gall-stones as compared with water which has about the same density as the human flesh the gall-bladder and the "Key-stone" were submerged in distilled water in a paraffin-lined paper box, and a roentgenogram was made.

The experiments on fresh gall-bladder specimens containing stones were sufficiently important to report in detail.

SPECIMEN No. I., from Dr. Erdman was of great importance, and a study of the illustrations of this specimen will demonstrate more graphically than words can describe how pure cholesterine stones surrounded by bile and contained in a gall-bladder will give the ring-like shadows so characteristic of gall-stones.

A roentgenogram of one hundred fifteen gall-stones laid out on a plate showed that there is not a trace of calcium in any of these stones and it should be particularly noted that there is no calcareous coating or ring. (Fig. No. 7A.)

The same stones submerged in bile show less distinctly than the bile surrounding them. That is, they cast a negative shadow. (Fig. No. 7B.)

The stones are now pushed together; the bile surrounding each stone appears as a ring and the bile itself has a "honey-comb" appearance. (Fig. No. 7C.)

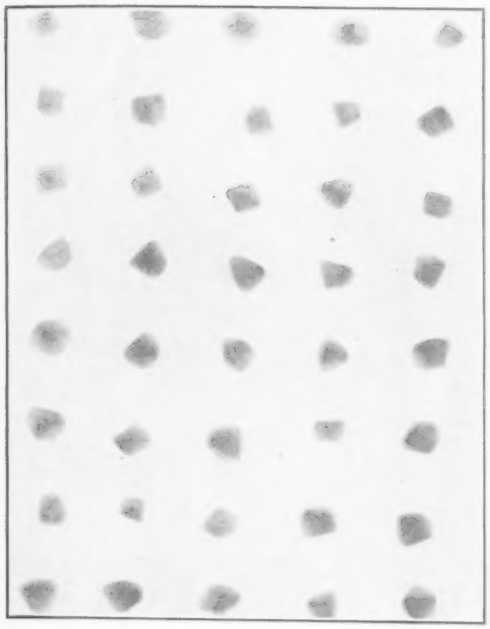


FIGURE 7A.

FIGURE 7B.

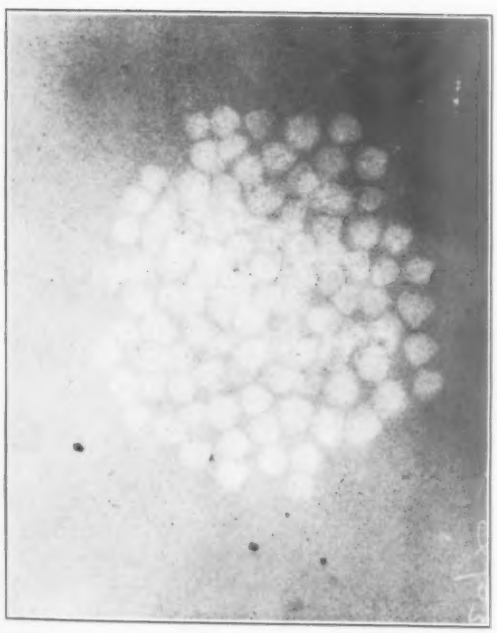


FIGURE 7C.

FIGURE 7D.

One more step. A gall-bladder containing stones surrounded by bile is submerged in water. The bile surrounding the stones presents a typical ring-like appearance and the stones are confined to an area the size and shape of the gall-bladder, but it must be remembered that there are no calcareous coatings to these cholesterine calculi, and that the ring-like appearance is caused by the surrounding bile. (Fig. No. 7D.)

SPECIMEN No. II., from Dr. Erdman was a normal sized gall-bladder containing bile and three stones.

(Fig. No. 8A.) Stones showing no evidence of calcareous deposit.

(Fig. No. 8B.) Stones submerged in bile and giving a negative shadow.

(Fig. No. 8C.) Gall-bladder and gall-stones submerged in water compared with the "Key-stone." Stones and bile are seen in the gall-bladder, but the stones are separated from each other by so much bile that they appear as bubbles of air or gas in the gall-bladder. Therefore, one or two large cholesterine stones in a gall-bladder filled with bile will resemble a bubble of gas in the intestines except that the gall-stones when seen are always constant in size and shape.

SPECIMEN No. III., from Dr. Erdman was an elongated and dilated gall-bladder filled with stones and bile.

Each stone has a small calcareous nucleus; this is hardly dense enough to show as positive shadow. (Fig. No. 9A.)

(Fig. No. 9B.) The stones are submerged in bile. It is noted that the calcareous deposit renders them nearer the density of the surrounding bile; therefore, they do not show a negative shadow so distinctly as the pure cholesterine stone does.

(Fig. No. 9C.) The gall-bladder filled with stones and bile and submerged in water compared with the "Key-stone." It is evident that this combination of a nucleus of calcium surrounded by a cholesterine coating is the most difficult to show but even this type can probably be detected in many cases by a careful examination.

These tests emphasized the astonishing fact that the cholesterine stone, unless it contained calcium, was so much less dense

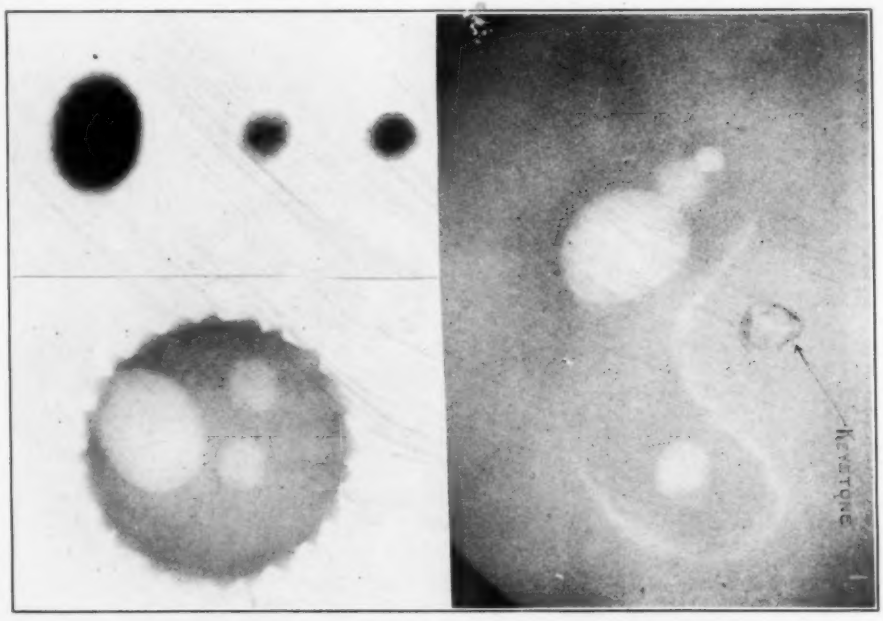


FIGURE 8A.
FIGURE 8B.

FIGURE 8C.

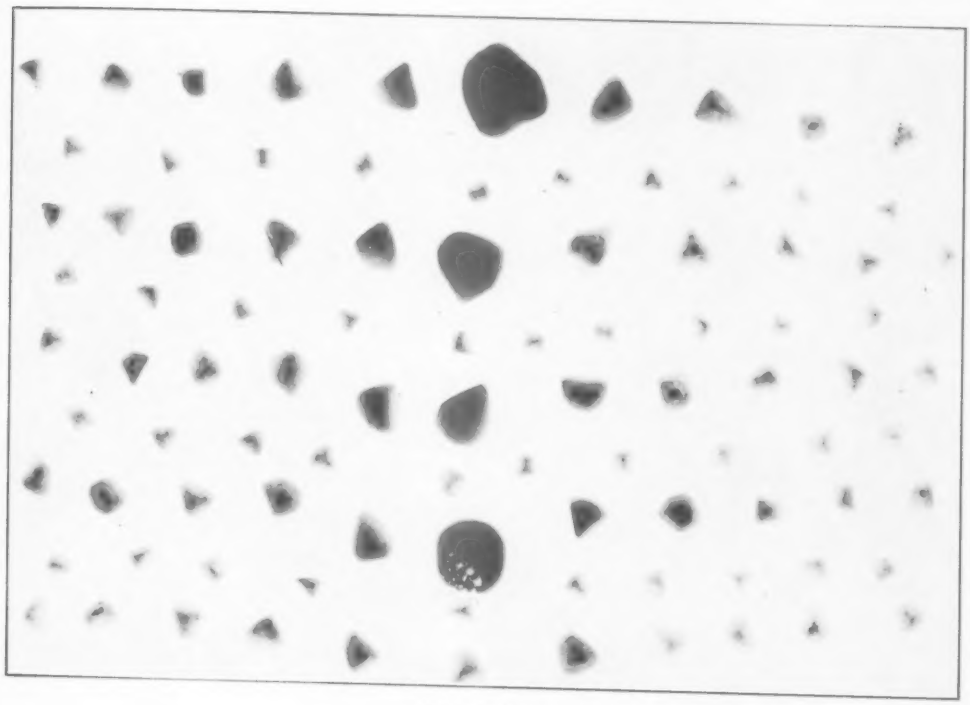


FIGURE 9A.

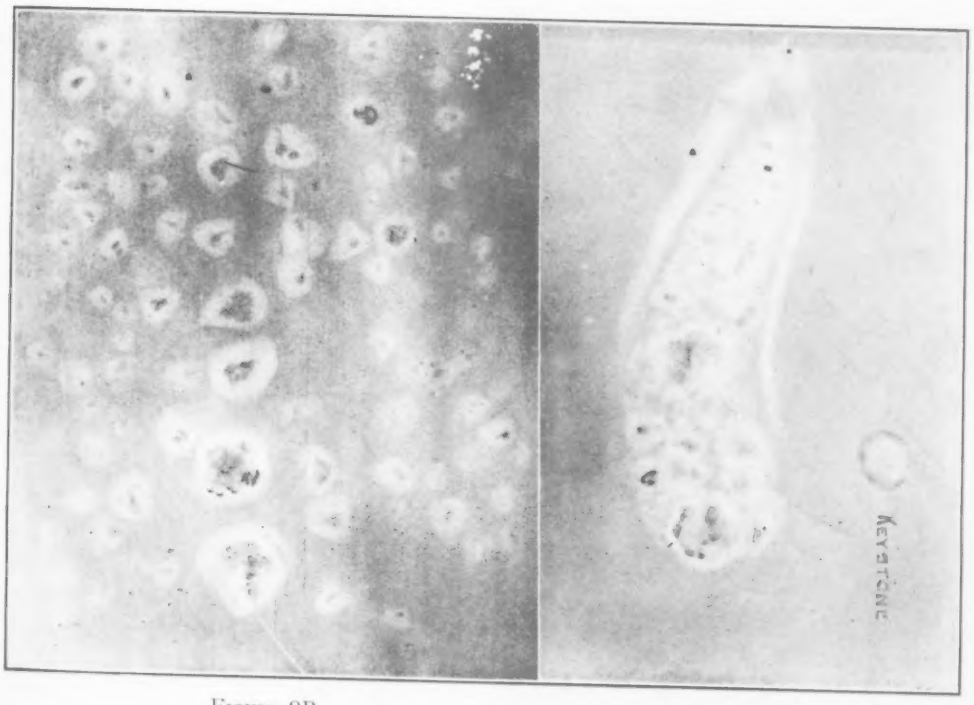


FIGURE 9B.

FIGURE 9C.

than the bile by which it was surrounded that it cast a negative shadow; that is, in the original roentgenograms the stone looked black like gas in the intestines instead of white like a kidney stone. This observation revived the hope that even the pure cholesterine gall-stone could be detected by the direct method of X-Ray examination.

The practical application of this experimental work is shown in the following case which has been examined three times within the past year, and which will be described in detail. The case came to operation and the dilated and thickened gall-bladder containing the stones is reproduced here and furnishes the connecting link between the experiments and their application.

CLINICAL HISTORY: A woman, aged 55, with an atypical history of gall-bladder disease.

ROENTGEN FINDINGS: Roentgen examination of the gall-bladder on three different occasions during the last year showed a dilated and dense gall-bladder at each examination.

ROENTGEN DIAGNOSIS: The following is a quotation from the roentgen report: "There is evidence of a dilated gall-bladder which is slightly irregular in shape and apparently has a small constriction at its upper end. The irregularities in the density of this dilated gall-bladder justify me in stating that there is seventy-five to eighty per cent chance of there being gall-stones in this gall-bladder."

SURGICAL FINDINGS: A dilated and greatly thickened gall-bladder containing several gall-stones. (Fig. No. 10A.)

Roentgenograms of the removed gall-bladder containing the stones surrounded by bile showed that the stones cast a negative shadow, that is, were less dense than the surrounding bile. This was accentuated when the gall-bladder containing the bile and stones was submerged in water. (Fig. No. 10B.)

Twenty-four hours after removal, decomposition caused the accumulation of gas in the gall-bladder. Roentgenograms taken then of the gall-bladder and stones in the air (Fig. No. 10C) and submerged in water (Fig. No. 10D) show very plainly the marked resemblance between the stones and bubbles of air or gas.

Many men will say that they care nothing for gall-stones in bottles, or gall-stones laid out on the plate, or submerged in water or in bile even if they are in the gall-bladder and examined immediately after its removal. Nor are they of value, except as a proof of the manner in which pure cholesterine stones in a gall-bladder filled with bile cast characteristic ring-like shadows.

"One swallow does not make a summer," but it indicates that spring is coming and as proof that these experiments have not been fruitless, I wish to describe briefly my failures and successes during the last four months.

I have made a definite or probable diagnosis of gall-stones in thirty cases. In only one case was there the amount of calcareous deposit which, six months ago, I deemed necessary to justify one in making a safe diagnosis of gall-stones.

Sixteen out of thirty have been operated upon. Of these sixteen cases, twelve were correctly diagnosed roentgenographically, three incorrectly diagnosed, and one very provisional diagnosis was incorrect.

In two of the three cases in which an erroneous roentgen diagnosis was made the real lesion would have been detected if a complete gastro-intestinal examination had been made instead of limiting ourselves to the experimental diagnostic feat of attempting to diagnose the case solely by detection of direct evidence of shadows of either greater or less density than the surrounding shadows. But these errors have been of greater value than the correct diagnosis. One was due to food in the cap (Fig. 11). Another was due to feces in a haustrum of the colon and the third was due to the stomach being crowded up and to the right by abdominal fat in a manner very char-

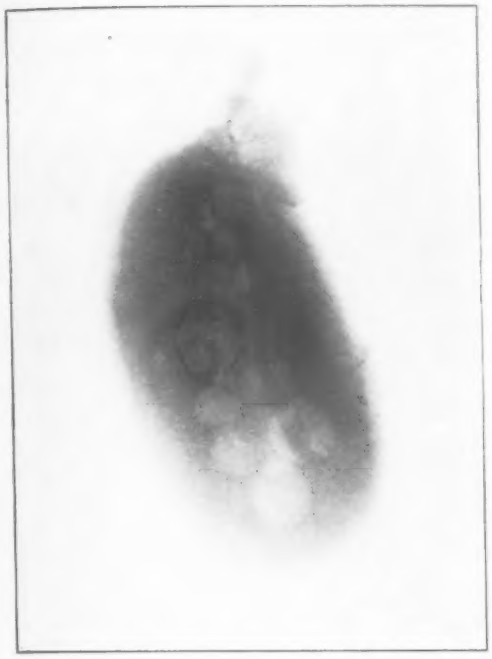


FIGURE 10A.

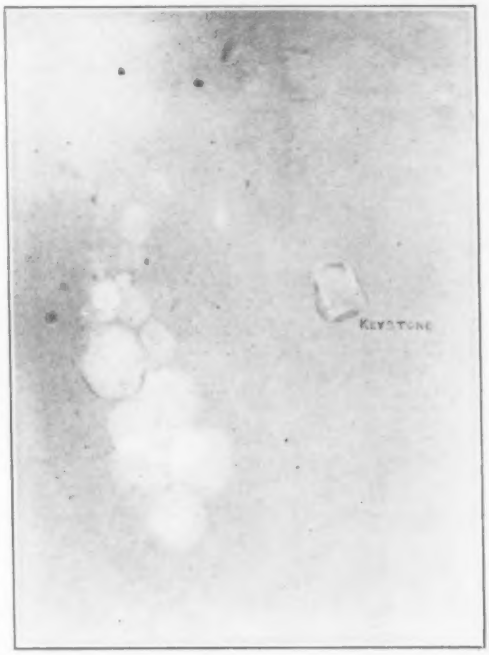


FIGURE 10B.

FIGURE 10C.

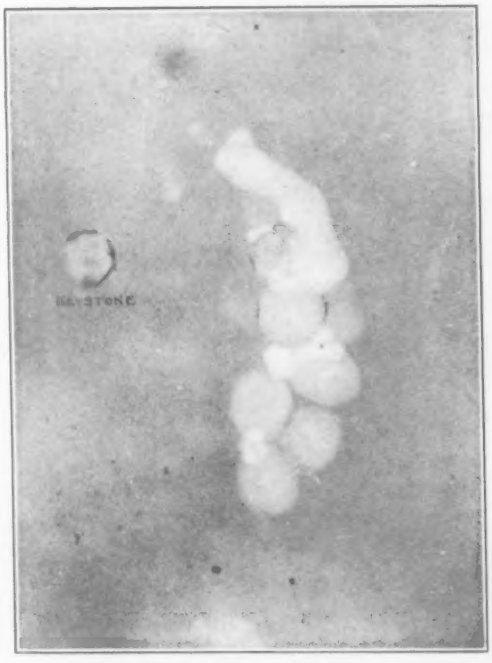


FIGURE 10 D.

FIGURE 11.

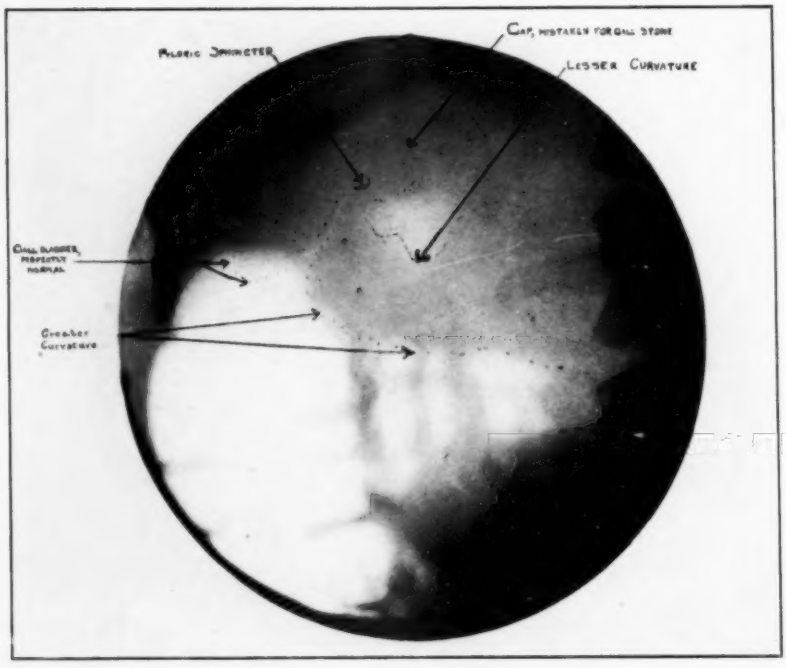


FIGURE 11B.

acteristic of gall-bladder adhesions. In this case the diagnosis was based on indirect evidence.

RESUMÉ

It is "safe and sane" to make a positive diagnosis of gall-stones when they have a definite calcium coating or nucleus.

Stones from thirty cases were examined by radiography; plates were also made of them surrounded by air, and later submerged in bile.

A gall-stone which had just enough calcium deposit to show in the living subject was selected as a basis of comparison for the stones from the thirty cases. This was called the "Key-stone." About twenty per cent of the gall-stones showed more calcium deposit than the "Key-stone." About twenty-six per cent showed a trace of calcium but less than the "Key-stone." About fifty-four per cent showed practically no calcareous deposit; in other words, they were practically pure cholesterine.

The alternating calcareous cholesterine rings indicate periods in the growth of the stones as strata of the earth's surface indicate geologic periods.

Eighty per cent of gall-stones submerged in bile cast a shadow less dense than the bile surrounding them. This observation would seem to preclude the hope of a positive diagnosis of gall-stones in more than twenty or twenty-five per cent of the cases. But the cholesterine stones are so much less dense than the bile surrounding them that they appear like bubbles of air and when many stones are present the bile surrounding them appears more dense than the stones and gives the area of the gall-bladder a honey-comb appearance or the ring-like shadows typical of a group of gall-stones.

This is graphically shown where stones are roentgenographed, First, in the air; Second, floating in bile; Third, grouped close together in bile; Fourth, surrounded by bile in a gall-bladder submerged in water.

These tests show that even the pure cholesterine stone may be shown as a negative shadow and that when a number of them are packed into a gall-bladder the bile surrounding the stones gives them ring-like shadows.

These preliminary tests have been applied practically during the last four months and the failures and successes of a series of sixteen cases that have been operated upon are briefly reported in this communication.

REPORT OF A CASE OF DIVERTICULITIS OF THE SIGMOID, WITH THE ROENTGENOLOGIC FINDINGS

By RUSSELL D. CARMAN, M. D., Mayo Clinic, Rochester, Minnesota

In a recent paper[1] I reported three cases of diverticulitis of the colon with the roentgenologic findings. Since the preparation of that article another case has come to my notice which I desire to report, with some additional remarks upon the diagnosis by means of the Roentgen ray.

Case 107,983. Male, aged 49 years. Examined June 12, 1914. **Family History:** Father died at 81 of diabetes; mother at 65 of "dropsy." Otherwise negative. **Personal History:** Negative. **Previous Diseases:** Catarrhal jaundice four years ago, with epigastric pain. He denies lues or gonorrhea. **Clinical History:** Present trouble began six weeks ago with gas in the lower bowel and sharp, shooting pain in the left lower abdomen, passing to the hypogastrium, intermittent in character and relieved spontaneously or by flatus. Attacks come only if he gets a "cold," and last four or five days; he has had three or four seizures in all. During the intervals there is some discomfort from gas, which, although there are no distinct vesical symptoms, "interferes somewhat with the bladder." He has lost some weight on diet. He has been constipated and used laxatives for years. He has had occasional tenderness in the region complained of during the past six weeks. **Physical Examination:** Mass in the sigmoid area, not now tender. Prostate slightly enlarged, otherwise negative. Small hemorrhoids. **Roentgen Findings** (after opaque enema): Filling defect in upper sigmoid. Marked spasticity of transverse, descending colon and sigmoid. A re-ray after the administration of belladonna was suggested but could not be obtained. This request was made because of the great amount of spasm noted, which had to be considered as a possible cause of the sigmoid deformity, although a lesion was strongly suspected. In the absence of a re-ray no attempt was made to carry the diagnosis further. **Operation:** A tumor of the sigmoid about 10 inches in length, extensively adherent to the lateral wall of the pelvis in the vicinity of the common iliac vein was removed (Mikulicz operation). **Pathologic Report:** Diverticulitis.

The roentgenogram (Fig. 1) shows a well-marked filling-defect in the upper sigmoid just below the pelvic brim. One or two apparently extralumenal shadows are seen at A. Another roentgenogram of the same case, made at the same sitting (Fig. 2) also shows what appear to be extralumenal shadows along the lower border of the transverse colon at B. No lesion was found in this part of the colon by the operator, and upon close inspection it was rather evident that these shadows were produced by barium cut off in the very spastic haustra.

In basing a diagnosis of diverticulitis upon extralumenal shadows, care should be taken to avoid confounding the latter with the shadows of barium pent up in contracted haustra, as illustrated above. I have frequently seen similar haustral shadows, especially in spastic colons. They differ from the shadows of barium-filled diverticula in the following particulars: First, haustral shadows are not accompanied by a filling defect in their region, while diverticular shadows may have a filling defect in their neighborhood. Second, haustral shadows tend to disappear or change their situation, although the change may not be a rapid one. Hence the screen examination should be sufficiently long, and plates should be made at intervals long enough to permit this shifting of situation. Diverticular shadows maintain a fixed position, and may persist after the bowel is emptied or partially emptied. For this reason, an examination after evacuation of the enema may strengthen the diagnosis.

In my previous report I mentioned the advisability of making one or two plates before giving the clysma, to eliminate the possibility of phleboliths and calcified glands which may simulate barium-filled diverticula. Renal and ureteral calculi should be added to this list, for I have seen at least one instance in which an ureteral calculus caused considerable perplexity by its resemblance to a barium-filled diverticulum.

I am calling attention to these small points because I believe that we are merely beginning to understand the roentgen signs of diverticulitis, and that by careful observation we can diagnose the condition with increasing accuracy.

[1] Carman, R. D.: The Roentgenologic Findings in Three Cases of Diverticulitis of the Large Bowel. Annals of Surgery, 1915, lxi, 343-348.

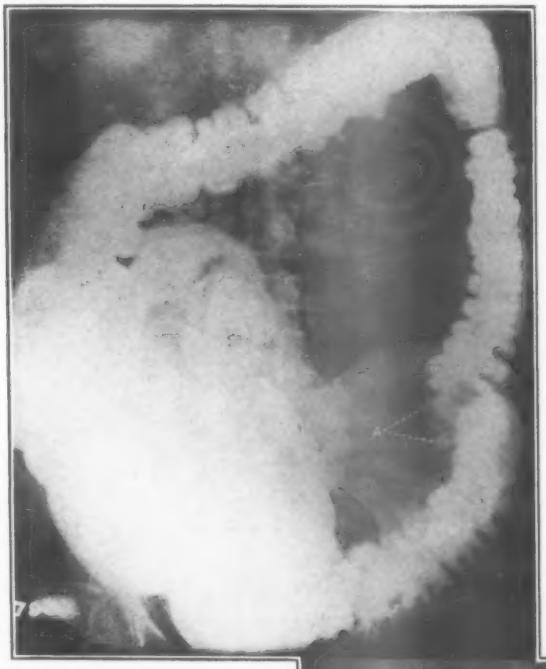


FIGURE 1.—Filling defect of sigmoid with extralumenal shadows—barium-filled diverticula—at A.

FIGURE 2.—Barium shadows resembling those of diverticula on lower margin of transverse colon at B.

THE ROENTGEN DEMONSTRATION OF MULTIPLE DIVERTICULA OF THE COLON*

By JAMES T. CASE, M. D., Battle Creek, Michigan

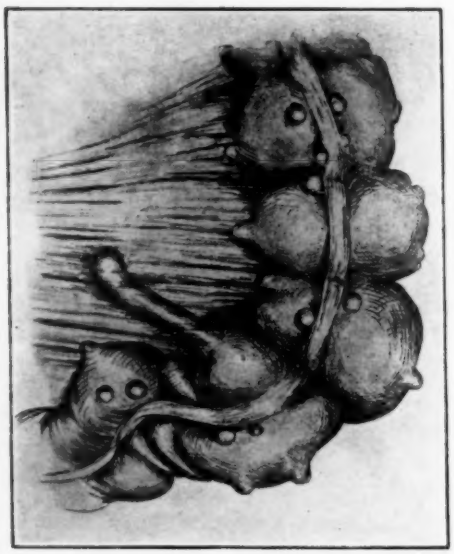


FIGURE 1. A figure from Mummery showing multiple diverticula of the colon in a man aged 62.

Recent surgical and roentgenologic experience has demonstrated that diverticula of the colon are by no means so rare as was formerly thought. Perhaps two of the most important surgical communications on the subject of colonic diverticula were the papers of W. J. Mayo and George E. Brewer at the 1907 meeting of the American Surgical Society. Since that date a number of important papers have appeared, especially those of [1]Telling, [2]Hartwell and Cecil, [3]Wilson, [4]Barbat, and [5]Giffin. The paper by Barbat is accompanied by an excellent bibliography.

Post mortem statistics covering 12,115 autopsies from three hospitals by Mummery showed diverticula found in only twenty-eight cases. Mummery was able to report fifty-eight cases and Telling eighty cases. The youngest case in Mummery's series was a patient aged twenty-two; the youngest case in Telling's series was a child of five. The average age of the cases collected by Telling and Mummery was sixty.

The above facts as to the frequency of diverticula are manifestly not correct. Groesser, quoted by [6]Mummery examined microscopically the sigmoid flexure of twenty-eight elderly persons and found diverticula in ten. Recent pathological studies by various workers seem to indicate that this condition is relatively frequent.

In his roentgenological practice of the last few years, the writer has recognized thirteen cases of diverticula of the colon. In

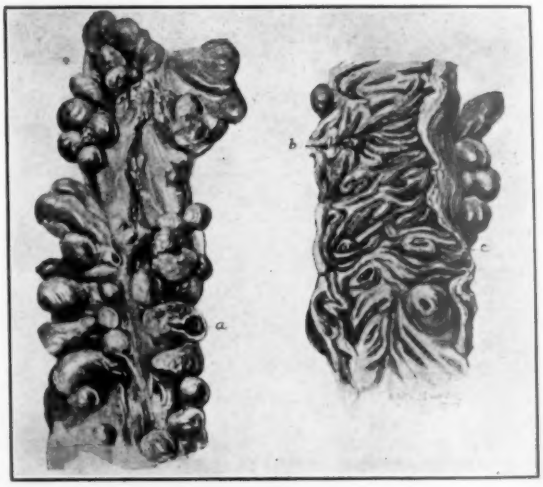


FIGURE 2 Two illustrations from Lynch, showing multiple diverticula of the sigmoid. In the left hand figure, the fat has been dissected from the outer aspect of the bowel. These pouches, for the most part, enter the appendices epiploicae. At *a* a single pouch has been dissected out, showing how they are buried in fat and liable to pass unrecognized unless especially sought for. The right hand figure shows the inner surface of the bowel from the same specimen. A concretion is seen at *b*, presenting in the orifice of one of the diverticula. At *c* the lipped orifice is clearly shown. Note the redundancy of the mucous membrane overlying the orifices.

*Read before the Mid-Winter Meeting of Roentgenologists in Atlantic City, January 30, 1915.

[1]Telling: The Lancet, Vol. I, 1908; also Diseases of the Rectum and Colon, J. M. Lynch, Lea & Febiger, 1914.

[2]Hartwell and Cecil: American Journal of the Medical Sciences, 1910.

[3]Wilson: Anna's of Surgery, February, 1911.

[4]Barbat: Surgery, Gynecology and Obstetrics, March, 1910.

[5]Giffin, H. Z.: Journal of the American Medical Association, September 14, 1912.

[6]Mummery, Sir Lockhart: The Colon.

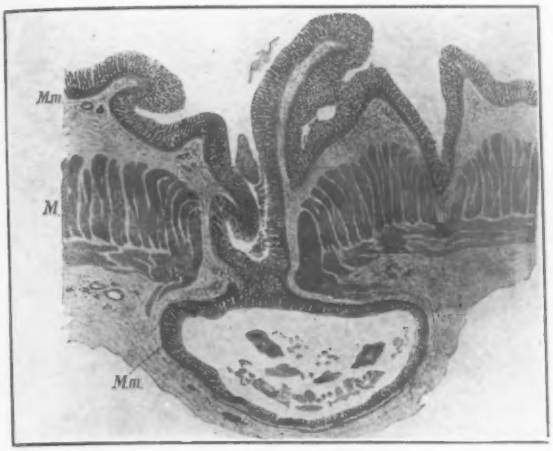


FIGURE 3. Microphotograph from Aschoff, showing the histologic structure of a diverticulum of the sigmoid. M.m., Muscularis mucosa; M, Muscularis.

ten of these cases, the diverticula were numerous. There was in one case a single diverticulum, in another case two diverticula and in a third four diverticula were found. All of these cases were discovered in the course of routine examinations of the colon by the writer's technic, which combines the employment of an opaque meal and an opaque enema.

The writer's special interest in the cases which he had been finding roentgenologically during the last three years, was awakened by an instance of diverticulitis reported by Abbe and LeWald in the Medical Record, August 1st, 1914. In this case the efficiency of the Roentgen method was thoroughly demonstrated by the successful differential diagnosis between colonic neoplasm and diverticula.

Diverticula of the colon vary in size from minute canals detectable only on microscopic study of cut sections, to large, finger-like pouches, the distal end of the pouch being dilated. [7]Hansemann, quoted by Adami, records a case of multiple diverticula, some the size of a pigeon's egg.

The diverticula may be single, but they are most often multiple, often occurring in great numbers. In a case recorded by [8]Hansemann there were four hundred diverticula, varying in size from a hemp seed to a pigeon's egg.

The average specimen shows from fifteen to fifty macroscopic diverticula, occurring anywhere from the cecum to the pelvi-rectal junction, sometimes even in the vermiform appendix. They are, however, usually limited to the sigmoid, and when found elsewhere in the colon are also found in the sigmoid. They occur in greatest number near the junction of the iliac and pelvic colon, but never below the pelvi-rectal junction. Diverticula may appear in any position between the longitudinal muscle bands; although sometimes found on the free edge of the bowel opposite the mesenteric attachment, they most often occur near the mesenteric attachment of the bowel. They occur just where the appendices epiploicae are commonly found. In fact, the sigmoid loop, in which diverticula are found most frequently and in greatest number, is frequently loaded with fat, which entirely conceals the hernial protrusions, particularly as these usually occur into or just beneath the appendices epiploicae.

Not infrequently the surgeon experiences great difficulty in finding the diverticula, even when the fat is present only in moderate amount, unless he is familiar with the characteristic appearances. (Figure 2.) Even when the bowel is incised, the openings of the diverticula are difficult to find, being

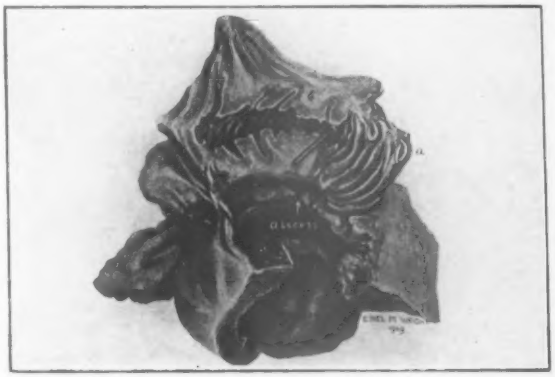


FIGURE 4. Figure by Telling showing chronic peridiverticulitis, with thickening and stenosis of the gut wall simulating carcinoma. Several small chronic abscesses, the largest between the bowel and bladder. Intestino-vesical fistula

[7]Hansemann: Virchow's Archiv, 1896, page 400.
[8]Hansemann: Loc. Cit.

FIGURE 5. Roentgenogram twenty-six hours p. c. showing several small diverticula of the pelvic colon.

concealed by an unusually redundant mucosa. They must be especially sought for with a probe. The more there has occurred secondary inflammation, the more redundant will be the mucosa, and the more difficult the detection of the diverticula.

Although congenital diverticula doubtless occur, these multiple diverticula are, for the most part, true herniae of the bowel. At first all the coats of the colon are represented except the muscular coat, and sometimes the microscopic study will demonstrate traces of the muscular layer. There is always a lining of mucous membrane, which is frequently the seat of chronic inflammation. As the result of this chronic inflammatory process, there may be a thick layer of fibrous tissue in the walls of the diverticula, as well as peritoneal thickenings and adhesions outside. These diverticula almost invariably contain fecal material; sometimes even a fecal concretion, which occupies the dilated end of the diverticulum. In fact, the pathological significance of colonic diverticula depends upon the fact that fecal material enters easily, but does not get out easily.

Considerable discussion has been aroused as to the cause of these diverticula. The general concensus of opinion is that they are pressure herniae, produced in most cases by long-standing constipation. This origin of the diverticula is further suggested by the fact that they are most frequent along the mesenteric attachment where the blood vessels of the colon pierce the muscular coat, and into or beneath the epiploic appendices, which also represent weakened spots in the bowel wall. Fecal concretions form, the muscular coat atrophies, ulceration of the thinned mucosa occurs, and the result is inflammation of the walls of the diverticulum with possible abscess formation or perforation. At the result of pericolitis, the fibrous tissue formed around the diverticulum may protect it from perforation, but this dense cicatricial mass may result in obstruction of

FIGURE 6. Multiple diverticula of the colon seen at the fiftieth hour following the barium meal. The barium residues shown at arrows are diverticula. The remaining shadows are due to retained opaque masses in the colon.

FIGURE 7. Roentgenogram seventy-four hours following a barium meal and immediately following a barium enema, showing the relation of the residues in the diverticula to the colon.

the bowel closely simulating malignant disease. When an abscess forms, it usually lies in the left inferior quadrant of the abdomen, next to the bladder, into which a fistulous opening frequently forms. In one series of twenty-four operated cases, seven exhibited a fistula between the bowel and the bladder. Jordan, in his discussion of "Lane's last kink," mentions that when the iliac colon becomes tied down in the iliac fossa so firmly that its lumen is obstructed, the wall of the bowel may give way, diverticula being formed. That pressure is not the only cause, however, is evinced by Mummery's experience, who has seen only one case of diverticula of the sigmoid above a rectal stricture.

The first papers on the subject recited cases in which there was present a fairly complete picture of diverticulitis in the lower left quadrant of the abdomen analogous to appendicitis in the lower right quadrant. *Gross obstruction* from scar formation, *peritonitis* (pericolitis), *adhesions*, usually between the sigmoid colon and the small bowel, the bladder or the uterine appendages in women, and *abscess* formation, with or without the occurrence of fistulae, to say nothing of the danger of degeneration into *carcinoma*, constitute the gross dangers from colonic diverticula.

The writer wishes especially to urge another danger, perhaps less serious in its immediate consequences, although very important in the matter of diagnosis—the *enterospasm*, which may be set up by a mild grade of inflammation occurring in the neighborhood of the diverticula. This enterospasm may cause spastic constipation and associated severe colitis.

Several of the writer's cases, discovered roentgenologically, were sent to him with a clinical diagnosis of spastic constipation or colitis. Indeed, it is this difference in the severity of cases which leads surgeons to classify many cases as latent. Telling found the average age of so-called latent cases was sixty-seven, while the average age of those

FIGURE 8. Multiple diverticula of the colon, especially numerous in the pelvic colon. Roentgenogram fifty hours p. c. The colon has been entirely emptied of barium except for the residues in the diverticula.

FIGURE 9. The same case shown in Figure 8, the diverticula being shown in relation to the enema-filled colon.

cases accompanied by severe clinical symptoms was fifty-five. As a matter of fact, the dangers in the latent cases are practically the same as those attending the poorly drained appendix, except that the possibility of harm is multiplied by the number of diverticula which may be present.

In the differential diagnosis, one must especially rule out localized peritonitis from other causes, tuberculosis, carcinoma, left-sided appendicitis and in women disease of the left uterine appendages.

The roentgenologic appearances of colonic diverticula are characteristic. Following the passage of an opaque meal through the colon, one observes small rounded shadows, evidently residues of the opaque salt, in the affected areas, usually near the junction of the iliac and pelvic colon. These rounded shadows usually occur in groups, always maintaining the same relation to each other. They are best seen on the second or third day, when, by careful screen study, especially during manipulation of the iliac and pelvic colon, one may detect the presence of these rounded shadows shortly after the opaque meal reaches the affected segment of the bowel. Stereoroentgenograms often conclusively show the relation of these small rounded shadows to the bowel. It most often happens, however, that the barium residues are not recognized until the second or third day, after most of the meal has been evacuated. It is then especially illuminating to administer a barium enema, studying the relation of the rounded shadows to the enema-filled bowel. This study may be carried out fluoroscopically, but roentgenograms are especially graphic, and in view of the rarity of the situation, are especially desirable. As above mentioned, stereoroentgenograms furnish the most decisive evidence.

The diagnosis may sometimes be made by means of the enema, but it is important that in such cases the enema be retained for some time. It usually occurs that in these cases the patient is able to expel the enema only from the rectum and lower pelvic colon, the remainder of the enema being retained. Study of the patient half an hour to an hour later will frequently demonstrate the filling of the diverticula in cases where they do not show immediately after the enema. In this manner many of the smaller diverticula may be demonstrated.

In Abbe's case, examined by LeWald, the diverticula retained bismuth up to the tenth day. In one of the writer's cases of multiple diverticula, on the sixteenth day they were seen to still contain barium, and doubtless retained it for a much longer period.

As previously suggested, several of these cases have been encountered in the routine study of cases of constipation, where no diverticula had been clinically suspected; in fact, in only a few cases had diverticula been clinically diagnosed previous to the Roentgen findings. The most common clinical diagnosis was malignancy in the severe cases and colitis in the cases presenting few symptoms.

DR. GEORGE H. STOVER

The ranks of the American Roentgen Ray Society have again lost one whose early pioneer work in his chosen specialty contributed at least indirectly to his untimely demise. Dr. George H. Stover was a familiar figure at the annual meetings of the society and his pleasant personality, coupled with his energetic and decisive manner, combined to make him a valuable member. His studies with the Roentgen ray date back to 1898 and since then he had been a hard student whose labors were productive of benefit to those in his own locality and to the specialists in this branch throughout the country. It is said of him that two years ago, when talking of the injured condition of his hands, he made the following remark:

"A few dead or crippled scientists do not weigh much against a useful fact."

He was a frequent contributor to scientific programs, both of his local society and to those of national importance. He was an enthusiastic member of our society and was always an ardent and zealous advocate of what he considered to be the best interests of Roentgenology. While his health during the past year or so impaired his activities, he was always as interested in the progress of his specialty as ever. We lament his loss, and extend to his family our sincere condolence in their bereavement.

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EDITORIAL

Anyone who peruses the recent numbers of the automobile journals is much struck by the work which is being done by the different committees appointed by the Automobile Engineering Association for the establishment of standards in various branches of automobile construction. It is an unhappy fact that no such standards exist in the construction of apparatus and accessories for roentgenologists. There is the widest diversity of construction in motors, transformers, rectifying switches, and the useless junk which has been brought out in the construction of timers has resulted in much loss in money to the individual who is anxious to keep up with a progressive science. The plate manufacturers take no pains, for example, to make their envelopes of any standard size, so that if one buys a stereoscopic plate changer for envelopes of a particular size, and then finds that another plate manufacturer is putting out a superior plate, he is confronted by the fact that manufacturer number two makes an envelope of odd size. Consequently, every time he uses his stereoscopic plate changer he indulges in more or less pleasant thoughts about the lack of common sense on the part of manufacturer number two.

The writer has in his possession a tube stand which has gone through various periods of development with different fittings for the cone on every model so that the cones are interchangeable.

Another feature which is worthy of attention, we think, is that the manufacturers pay very little attention to the use of commercial sizes of screws and other fittings, making use, oftentimes, of their own particular standard, which makes replacement oftentimes very expensive.

The amount of material which is consumed and paid for by the roentgenologists throughout the country would seem to demand that the manufacturers and dealers in accessories should take some account of the present situation to reduce the cost of the manufacture, giving each individual manufacturer a greater profit and tending to make the cost to the consumer less.

Another unfortunate situation is that many of the manufacturers have not employed competent electrical engineers in the designing of their pieces of apparatus, but have depended rather on "rule of thumb" methods without a proper comprehension of the underlying principles of electrical construction. If more money were paid to the designing part of the manufacture, we think that there would be less cost to be added to the selling price.

NOTICE

A meeting commemorative of the twentieth anniversary of the discovery of the X-Ray was held at the New York Acad-

emy of Medicine, Hosack Hall, on May 5th, 1915, by the Roentgen Ray Association of Greater New York. The following addresses were delivered:

"The Influence of Roentgen's Discovery on Physical Science," by PROF. BERGEN DAVIS of Columbia University.

"Roentgen's Discovery, Its Recent Developments and Future Possibilities," by WM. D. COOLIDGE, PH. D., of Schenectady, N. Y.

"Historical Review of the Development of the X-Ray Tube" (Illustrated by Lantern Slides), by H. CLYDE SNOOK, PH. D., of Philadelphia, Pa.

"The Physical Characteristics of Roentgen Radiation with Reference to the Questions Involved in Treatment," by PROF. J. S. SHEARER of Cornell University.

"The Influence of Roentgen's Discovery on Medicine," by LUDWIG KAST, M. D., of New York.

"The History and Development of the Art of Roentgen Ray Diagnosis," by PERCY BROWN, M. D., of Boston, Mass.

I. S. HIRSCH, M. D.,
Secretary,
96 Park Avenue.

Following Applications for Membership in the American Roentgen Ray Society Received by the Executive Committee

CLARENCE FRANKLIN BALL, age 37.
Gryphon Cornor Block, Rutland, Vt.
Recommended by Jas. T. Case, A. W. George.

FREDERICK WILLIAM O'BRIEN, age 33.
12 Cottage St., Brockton, Mass.
Recommended by A. W. George, Frank B. Granger.

WILLIAM WERNER WATKIN.
Phoenix, Ariz.
Recommended by Albert Soiland, Wm. B. Bowman.

JOSEPH W. ROWNTREE.
Chicago, Ill.
Recommended by R. D. Carman, Jas. T. Case.

FRANCIS FRANK BORZELL.
Philadelphia, Pa.
Recommended by W. F. Manges, David R. Bowen.

HENRY A. CLEAVER.
Wilmington, Delaware.
Recommended by Geo. E. Pfahler, Willis M. Manges.

JAY DONALD ZULICK.
Philadelphia, Pa.
Recommended by Geo. E. Pfahler, Willis F. Manges.

EDWARD H. POND.
Pittsburgh, Pa.
Recommended by Willis F. Manges, David R. Bowen.

ALEXANDER BERKELEY MOORE, age 30.
Rochester, Minnesota.
Recommended by P. M. Hickey, F. S. Bissell.

JAMES G. VAN ZWALUWENBURG, age 40.
Ann Arbor, Michigan.
Recommended by P. M. Hickey, Sidney Lange.

ISAAC LEVIN, age 47.
119 West 71st St., New York.
Recommended by Arthur F. Holding, Leopold Jaches.

LOYALL C. KINNEY.
Los Angeles, Cal.
Recommended by Albert G. Miller, David R. Bowen.

ROENTGEN RAY LABORATORY

In response to numerous requests an opportunity to secure instruction and practice in Roentgen technology is now offered at the Cornell University Laboratory, Ithaca, N. Y. An excellent modern equipment is provided and several years' experience in teaching the work has shown the needs and developed a series of experiments suited to the purpose. Special attention is given to the matter of dosage, and to the use of both the ordinary and the Coolidge tube, as well as to radiography and fluoroscopy.

The work may be taken during the summer session, July 6 to August 16, if desired. The tuition for the summer session is thirty dollars for the session.

If taken during the year a minimum charge of thirty dollars is made which covers tuition for two weeks, fifteen dollars per week is charged for each additional week. Plates, papers, films and chemicals are to be furnished by the individual.

As the rate will indicate the course is not given to secure any profit to the University, but as an aid to this important field of work. The laboratory is under the direct personal supervision of Prof. J. S. Shearer and correspondence relating to the work should be addressed to him at Ithaca, N. Y.

BOOK REVIEWS

RADIOGRAPHY, X-RAY THERAPEUTICS AND RADIUM THERAPY. *By Robert Knox.*

This is a very large and extremely well illustrated volume, which deals quite exhaustively with the topics implied in its title. The author has followed the time honored custom of incorporating many of the illustrations of apparatus borrowed from different instrument makers' catalogues. Many of these types of apparatus are now somewhat obsolete and their illustrations only serve to make the volume more unwieldy. The space devoted to different types of apparatus, we think, is out of proportion to the size of the work.

The author has a decided innovation in the matter of illustrations giving reproductions or facsimiles of the original plates, and of the prints from the plates. This method of showing the bones white in the reproductions as in the original negative, as well as the bones black as in a print, is here given a very good comparison. There are always two plates of each subject, one in black and white and the other in white and black. While this has added much to the size of the work, it will be a feature which undoubtedly will be very useful to the beginner in Roentgen diagnosis. The chapters on bone pathology, bone traumatism, etc., are complete and well illustrated. The chapter on radiography of the chest is also very complete and useful. The wealth of illustration adds much to the value. The pages on the diagnosis of diseases of the gastro-intestinal tract reflect much of the German thought upon this subject and do not give credit to the direct method as compared with the indirect method. Duodenal ulcer is dismissed with a few lines. The chapter on the radiography of the urinary tract is instructive although we fancy that most Americans use much shorter exposures than are spoken of in the text. The chapter on Radiotherapy is copiously illustrated with photomicrographs of tissues which have been radiated. The subject of radium therapy occupies a considerable portion of the work and is comprehensively treated. There is a good glossary at the end and a voluminous index.

Altogether, we consider the work to be the most useful one for the average student of Roentgenology of any which has appeared in the last few years. The publishers are the Macmillan Company, New York. Price $8.00.

TEXT-BOOK OF RADIOLOGY. *By Edward Reginald Morton.* E. B. Treat & Company, 241 West Twenty-third Street, New York City.

This is a work of 220 pages, the first half of which is devoted to a very complete and lucid description of the different types of generating apparatus with a full description of the various types of tubes and their advantages and disadvantages. The first half of the book, describing the apparatus, and especially the explanations concerning the principles of construction, is very valuable and should be found in the library of every progressive Roentgenologist.

The second half of the book is taken up with what the author calls "Regional Radiography," and after perusing its pages one wishes that the text were more voluminous. The subjects which the author has treated are handled very well, but there is an absence of detail and completeness which is so often valuable in a work of this description.

With regard to the illustrations, they have been very well chosen, but unfortunately some of them lack the detail which undoubtedly was present in the original plate. We presume it is very hard for an author to persuade the publisher to put into a volume of this kind the necessary quality of paper to make the illustrations of the greatest value.

Altogether, the volume is a distinct contribution to English literature and will undoubtedly be of great help to those who may be fortunate enough to possess it.

ABSTRACTS

Grandy, C. C., M. D., Fort Wayne, Ind.: A case of Diaphragmatic Hernia diagnosed by Roentgen ray. (Jour. Amer. Med. Assoc., April 10, 1915, vol. lxiv, No. 15, p. 1237.)

The mixture of three ounces of barium sulphate and twelve ounces of buttermilk was given by Grandy in this case, and after a few minutes a large picture of the abdomen was taken to locate the stomach. Only a few flecks of barium were present. Then a roentgenogram of the chest was taken, and the stomach was found in the left chest. This also showed an old fracture of the right clavicle, which occurred forty years before, and two fractured ribs on the left side. A lateral picture of the chest was taken to determine the height of the stomach. A marker was put on the left nipple with the patient lying on his side. This showed the stomach to be lying about four inches above the left nipple. Another plate showed the stomach very plainly in the area where the heart should be, and a fleck of bismuth in the small bowel, going through the hernial opening. The percussion note over the lower left chest after the barium meal was dull as compared to the same note before the meal.

Necropsy: The chest was rather barrel-shaped and symmetrical. Opening of the chest revealed that the heart was displaced to the right, so that almost the entire organ was in the right chest cavity. In the left chest cavity was the enlarged stomach, including the pylorus, which filled the upper two-thirds of the left pleural cavity, with the exception of a small space occupied by the collapsed lung. Beneath the stomach were about fifteen feet of the small intestine, and below that were the spleen and a part of the splenic flexure of the colon.

Further examination revealed the opening through the diaphragm between the left lateral muscle and about one inch to the left of the esophageal opening. The stomach adhered to the upper third of the chest cavity with numerous adhesions. The small bowels were very red, and here and there were flecks of plastic exudate. The spleen was very dark, soft, a little enlarged, and covered with a plastic exudate. The large bowel was attached to the spleen with the exudate.

Rubin, I. C., M. D., New York City: Roentgen ray diagnosis in Gynecology with the aid of Intrauterine Collargol Injection. (Surgery, Gynecology and Obstetrics, vol. xx, No. 4, April, 1915, p. 435.)

To establish the safety of the intraperitoneal injection in determining the patency of the Fallopian tubes, 5 ccm. of collargol of a 15 per cent. solution was introduced by Rubin into the peritoneal cavity of two rabbits. The animals were unusually quiet and refused food for twenty-four hours; after that time they behaved normally. Since the amount injected in these rabbits did not prove toxic, it is fair to assume that a smaller dose introduced into the uterus for diagnostic purposes should not be attended with toxic effects. It was further necessary to prove that collargol injected into the uterus will pass into the tubes and then into the peritoneal cavity.

Percentage of Collargol Necessary. The first studies made were on cadaver material of very old subjects. The solution used was 15 per cent. to 20 per cent. in strength. The shadows obtained were very dense. Rubin found also that in certain instances the fluid did not go through the tubes. On investigation this was found to be due to an obliterative endosalpingitis not uncommon in senile individuals. The solution was also too thick to pass through these tubes because later the same tubes permitted the passage of an aqueous solution of methylene blue. Rubin found also that a five per cent. solution of the silver salt did go through when a 15 per cent. or 20 per

cent. solution did not. When he tried the more concentrated solutions and found they did not pass through the tubes of the uteri Rubin had at his disposal for the experiments, he conceived the idea of employing the injection of collargol into the uterine cavity for the purpose of diagnosing intrauterine conditions especially in these cases where the introduction of a uteroscope was not feasible. For such purpose the method can be used without any danger, as later observations proved.

The 10 per cent. collargol solution gives satisfactory pictures, and for illuminating the tubes prove sufficient. A more concentrated solution is not likely to pass through, while a 5 per cent. collargol solution is not satisfactory. In a series of cases in which this percentage was tried the pictures were negative as far as collargol shadows were concerned.

Concerning the irritating effects on the peritoneum, Rubin injected collargol in eight cases in strengths varying between five and ten per cent.; one patient received three injections. The effects of a peritoneal irritation should in general be manifested by (1) pain, (2) tenderness and abdominal rigidity, (3) abdominal distention, (4) temperature elevation and increase of pulse rate, (5) gastric disturbance, (6) disability, (7) the development of an inflammatory exudate, and (8) disturbance in ensuing menstrual periods.

For the method to have a clinical value, these conditions and symptoms, or at least the more serious ones, must be absent. Rubin's object was next to test the clinical application of the method in relation to possible untoward symptoms and sequelae. It was also desirable to ascertain whether the injection itself would prove painful.

Eight cases are reported, in which the method was tried.

TECHNIQUE: The patient is placed on her back on the Roentgen ray table; her knees flexed and separated. The use of the bivalve speculum saves the need of an assistant; it is therefore preferable. The cervix is exposed, cleaned, and then painted with iodine. The superior aspect of the anterior cervical lip is grasped with a tenaculum. A sound is introduced to get an idea of the dilation of the uterine cavity and of its approximate size. The syringe used is a modified Braun intrauterine sound with a Record barrel. It should be tried first and should work smoothly. The syringe should contain 5 ccm. of collargol solution (10 per cent). The intrauterine nozzle is introduced to just above the internal os. The Roentgen ray plate is then put under the sacral region of the patient. The Roentgen ray operator should be ready when the injection is to be made. The injection should be made without undue pressure—3 mm. mercury is all that is required. When the sound does not fit closely into the cervical canal, I have added the elastic conical rubber urethral point, which may be fitted into the external os. When the fluid is observed to flow outside of the uterus, it is well to stop. The excess should be wiped away. The speculum is partly withdrawn so as not to overlap the collargol shadow, and the Roentgen ray is then taken.

After the Roentgen ray exposure an attempt should be made to recover by suction the fluid within the uterus. Often more than half is recovered. The remainder is for the most part discharged within the next twenty-four hours. Should there be pain, it is advisable to stop the injection. Pain usually denotes distention of uterus or tube or escape into the peritoneal cavity. In either event it is an indication that sufficient fluid has been injected for diagnosis. When in doubt as to the presence of an infective process in the uterus or tubes the patient should be kept quiet for a day or two and observed. When there has been no pain there is no objection to permitting the patient to go home.

The first case in which the method was tried left nothing to be desired. The injection was not painful, the picture was clear, and the course after injection was unattended by any ill effects. The Roentgen

ray picture served incidentally to *differentiate an extrauterine tumor from an intrauterine tumor,* which the ordinary physical method of diagnosis had failed to do. The cases in order were (1) Double diseased adnexa. (2) Ovarian cyst with incomplete abortion. (3) Fibroid uterus. (4) Small uterus (sterility), with subacute salpingitis. (5) A case of total amenorrhea in a woman, thirty-two years of age, and married twelve years. In this series of cases Rubin learned that with the tubes occluded the injection of collargol solution was absolutely safe; that with the tubes patent the fluid may and does pass into the peritoneal cavity without, however, causing an appreciable peritoneal irritation. The omentum in such instance serves to take up the collargol as it would behave in the presence of some other foreign substance as lamp-black, etc. The post-operative recovery in these cases was satisfactory. Rubin also found that in the presence of an infected tube which is patent there may be symptoms and signs of a peritoneal irritation. The effects pass over in thirty-six to forty-eight hours without the necessity of operative interference, and no further ill effects are noted. Also that in the presence of an incomplete abortion or a febrile postabortive endometritis a rise in temperature may be noted. There was no peritoneal irritation, however.

In none of these cases was the menstrual cycle disturbed. They all reported the onset of the next period at the regular time.

In a case of total amenorrhea the patient received two intrauterine injections on two different occasions and each time she was permitted to go home immediately after the injection. She had no pain or discomfort.

The Roentgen ray pictures in those instances where 5 per cent collargol solution was used were not satisfactory, indicating that a stronger solution was necessary. Rubin then reverted to 10 per cent collargol solution, which gave satisfactory pictures.

The case of total amenorrhea, who had had two previous injections, then received 5 ccm. of 10 per cent collargol solution. The fluid was injected under considerable pressure, as it was thought the tubes were closed. This injection was attended by colic and vomiting. Pelvic pain lasted a few hours. There were no manifest symptoms of peritoneal irritation. There was no doubt, however, that the forcible injection caused the colic. The quantity employed was too much, some of the fluid probably being forced into the parenchyma of the uterus if not causing pain by distention of the left tube.

The 10 per cent collargol solution was further employed in "illuminating" the left uterus of an asymmetrical double uterus, and in one case to show the uterine cavity in a patient who had had a bilateral salpingo-oophorectomy two and one-half years ago. This patient was permitted to go home immediately after the injection. Roentgen ray picture taken one week after injection failed to reveal any deposits or masses of collargol. From these cases it is deduced:

1. That a 10 per cent collargol solution is essential for a satisfactory Roentgen ray picture.

2. That under mild pressure (i. e., about 3 mm. of mercury) the injection is not attended by pain.

3. That it is desirable not to inject more than 5 ccm. of the solution in the average case, especially in cases of sterility with so-called infantile uterus.

4. That the cases should be selected. One should make sure there is no active infection of the uterus or the tubes. Postabortive conditions with fever are contraindications.

5. That the method is safe as far as peritonitis is concerned even in these cases, and in properly selected cases should be absolutely safe.

6. That there are no bad sequelae; i. e., no gross pelvic adhesions or exudates, as determined by bimanual palpation, have

been found subsequent to the collargol injection.

7. That the menstrual cycle is not disturbed.

8. That the method is of aid (a) in the diagnosis of the patency or the occlusion of the tubes; (b) in differentiating intrauterine from extrauterine tumors as intraligamentous cyst from myoma; (c) in certain malformations of the uterus, and possibly also of the tubes; (d) in determining whether a single or bilateral salpingectomy had been done on a patient that had previously been operated; (e) in studying true flexions of the uterus and maldevelopments.

Moorhead, T. Gillman, M. D., F. R. C. P. I., Dublin: Treatment of Graves' Disease by Roentgen Rays. (The Dublin Journal of Medical Science, November, 1914.)

A large dose of rays applied to any gland depresses the activity of that gland, and repeated exposures lead to fibrosis. Some cases that have been operated on subsequent to a Roentgen ray course have shown extensive fibrosis, more particularly of the superficial portions of the glands, and the occurrence of contraction of blood vessels is recognized by Kocher, who believes that a preliminary short Roentgen ray course may be of advantage in diminishing risks from hemorrhage at a subsequent operation. If fibrosis undoubtedly occurs, it appears obvious that results should be expected from a Roentgen ray course similar to those obtained by operation. The length of time required to get the result will be, of course, greater, but the danger will be less.

Of nine cases treated, one very severe case remained under observation for a period of three weeks only, and with the exception of lessened tachycardia was not apparently improved during that period. The remaining cases have been under observation for periods varying from five years to a few months. Two of them have been treated so recently that it is impossible to feel certain of the ultimate result, but at the present time they are both very much improved. Of the remaining six cases, five are completely cured as far as symptoms are concerned—that is, they are able to live ordinary lives, doing ordinary work, and do not suffer from palpitation, tremor, or any of the symptoms of Graves' disease. In each of them some enlargement of the thyroid can still be made out, but the enlargement is slight, and on palpation the gland is felt to be firm and fibrous instead of soft and vascular. Roentgen rays are worth a thorough trial in this disease, but Moorhead emphasizes the fact that no immediate sensational result is to be expected, and that patience and perseverance are required. A course of rays seems to be the starting point of a general improvement, sometimes after all other means have failed, and the improvement continues long after the course has ceased, and ultimately results, in a majority of cases, in complete cure. In cases that do well, the thyroid gland becomes obviously hard and apparently fibrous, and the usually apparent dilated veins on the surface of the gland disappear. In three of Moorhead's cases, careful blood examinations showed a gradual return from an excessive lymphocytosis to a normal count. Little stress is laid on initial diminution of tachycardia and restlessness, as similar improvement is often met with at the beginning of a simple treatment by rest and drugs, but such improvement is to be expected almost at once on starting the Roentgen ray exposures.

Hofrat, Dr. A. Theilhaber, Munich, Germany: Causal Factors in the Disposition to Cancer in Old Age. (Surg., Gyn. and Obst., Nov., 1914.)

In his discussion of the value of roentgenization following cancer operations by Roentgen rays, Hofrat says that the Roentgen rays will have to be used immediately following the operation; it will be necessary to use the rays intermittently for years at definitely timed intervals. Remnants of tissue may be destroyed by the diacutaneous method, if primary union is desirable. Success will be obtained in only a very small number of cases. The probability of success is greater when the rays are ap-

plied through an open wound. In such cases, where we do not suture on account of a plastic operation to be undertaken at a later date, or for other reasons, it is advisable to leave the wound open for a longer or shorter time, and to expose it intensively to the Roentgen ray. However, Werner, who often used this procedure, reports that it does not positively protect against recurrence. Concerning frequent prophylactic, intermittent Roentgen ray therapy to bring about the immediate destruction of beginning recurrences, Hofrat does not believe that any great number of successful results can be obtained thereby. He refers to the communications of Heinecke, whose investigations were corroborated by Krause, Aubertin, and others, who showed that the blood-forming organs are very much endangered by intensive use of Roentgen rays. The cells of the bone-marrow, spleen, and lymphatic tissues react markedly to Roentgen and radium rays, producing a degeneration of the nuclei. The number of the lymphocytes and leucocytes decreases to subnormal, after a transient polynuclear leucocytosis, to recuperate only slowly. The blood cells cannot be protected by a filter technic, as they are attacked especially by the harder gamma rays passing through the metal filter which we need for applying Roentgen rays. The blood-forming organs undoubtedly recuperate from the disturbances caused by the rays. However, if the rays must be used again and again, recuperation ultimately ceases.

Considering the great importance a perfect function on the part of the blood-forming organs possesses as a prophylaxis against cancer, it is not probable that by means of the sole use of radiotherapy the percentage of recurrences is markedly decreased. If one wished to destroy with a probable certainty beginning recurrences before they become macroscopically recognizable, then the Roentgen ray must be used several times a month for many years. Experience in "Roentgen-cancer" has shown that the disposition to cancer is directly increased by the too frequent use of the rays. If the rays are used very diligently after operations, the cancer disease is frequently aggravated and a recurrence is probably directly excited. If the rays are not used very frequently, then it must be a coincidence if one does hit a recurrence which is not yet macroscopically recognizable and thus prevent its growth.

Fisher, Mulford K., M.D., Philadelphia, Pa.: The Roentgen Ray Treatment of Exophthalmic Goiter. (New York Med. Journ., March 6, 1915, p. 455.)

The history of an unusually severe case of the disease in which the rays seemed to have almost a specific influence is cited by Fisher. Mrs. C. W., aged thirty-two years, wife of a physician, first noted symptoms of cardiac palpitation, tremor, and general weakness, sixteen months before; enlargement of thyroid gradually increasing in extent noted two months later; shortness of breath pronounced; generalized sweating; patient lost forty-five pounds in weight in less than a year, dropping from 170 to 125 pounds. Exophthalmos set in only within the past four months.

Operation was deemed inadvisable on account of the patient's poor general condition, and Roentgen treatment advised. When she first began treatment, her asthenia was pronounced, the mere exertion of getting on the table produced utter exhaustion and dyspnea; pulse rate 134. Improvement was extremely rapid in this case; within ten days the nervousness and cardiac palpitation diminished, the exophthalmos disappeared within three weeks, and general amelioration of the symptoms was observable within a month; in three months, during which time Mrs. W. received tri-weekly treatments, she had gained twenty-seven pounds, and the thyroid enlargement was no longer discernible.

It is now over three years since this patient first came for treatment, and she is and has been practically free from all symptoms of hyperthyroidism for over two years of that time. About once in six or eight weeks she returns for a prophylactic treatment with the Roentgen rays.

Another case cited as one included under the group of those reported as improved is: Mr. A. M., aged eighteen years, attending high school, mild symptoms of hyperthyroidism with moderate thyroid enlargement, confined principally to the right lobe; latter was first noted fifteen months previously; pulse rate 108; no exophthalmos.

Twenty Roentgen exposures served to reduce his pulse rate to 82 and relieve the tremor, which was his most annoying symptom. Occasionally there was a tendency to arrhythmia and shortness of breath. This patient was under observation for eleven months and when he had a relapse he returned for three or four exposures, which rendered him fairly comfortable for a period of four to five weeks. The goiter was coincidently markedly reduced in size.

In the cases in which the Roentgen rays manifested a curative or beneficial influence, Fisher says, the progress toward improvement, as a rule, followed no definite course. Some cases respond speedily to the effects of the rays; the nervousness, the dyspnea, and the sweating subside after two or three exposures. Other patients required twelve to twenty treatments before improvement could be noted. One thing was quite remarkable: In practically every case, with the exception of those in which no benefits were apparent by the exposure to the Roentgen rays, there was a marked increase in bodily weight. Arrhythmia and tachycardia, with the concomitant dyspnea, probably the most distressing symptoms of the disease, responded to treatment somewhat more slowly than the eye symptoms. It was remarkable to note in one of the cases the rapid subsidence of the exophthalmos. After one exposure to the Roentgen rays, the protrusion of the eyeballs had practically ceased.

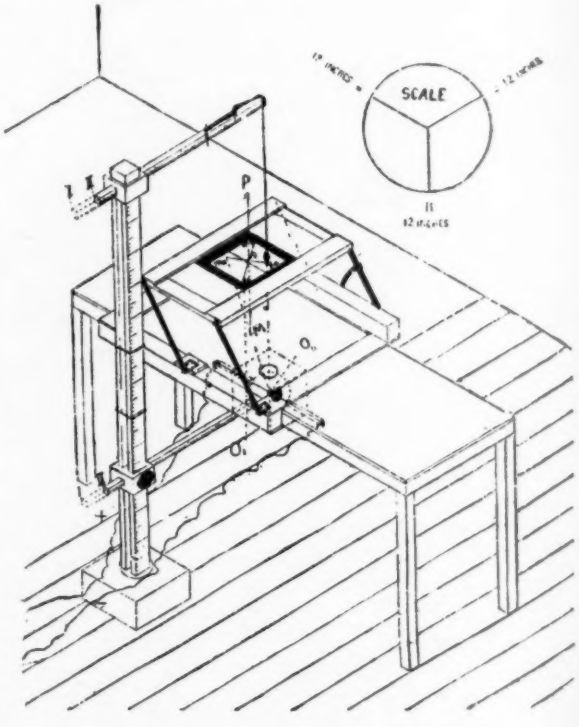
In none of the seven cases reported by Fisher as cured has there been any tendency toward recurrence for two years since cessation of treatment; of those reported as improved (five in number) there has been an occasional tendency to attacks of hyperthyroidism, but these have been checked by renewed Roentgenization of the thyroid.

The technic is simple. Fisher uses a tube of medium hardness; the rays are filtered through leather or aluminum, to avoid, as far as possible, injury to the skin; one m.a. to two m.a. of current passes through the tube; the face and all surrounding areas are protected by lead; ten minutes is the average duration of a single seance, and bi-weekly exposures are made. If there is a symmetrical enlargement, each side is exposed separately; if asymmetrical, particular attention is directed toward the more greatly enlarged lobe. Otherwise, treatments are given with the patient in the supine position with the tube focused over the center of the gland.

Cotton, William, M. D.: An Apparatus for Roentgen Ray Localization. (Br. Med. Journ., I, No. 2828, Mar. 13, 1915.)

William Cotton has devised an apparatus that is adapted for almost any of the prevailing methods of localization and for any part of the body, except perhaps the orbit. Any form of upright tube stand, if not too elaborate, will do; nor is any special table required, provided it is level, narrow, long, straight-edged, and transparent to Roentgen rays. The plate-holder consists of an upper and a lower deck, connected similarly as in the case of the two beams of the ordinary parallel rulers, and capable either of being clamped in any position or of being used free. The lower deck can be slid along either edge of any straight table, and, being reversible, can be applied to the table from either side or end, and is not any obstacle to the passage of Roentgen rays. The upper deck can by means of adapters support any plate or fluorescent screen, so as to slide from either side of the table to the other. On the fluorescent screen and in close contact with its surface can be placed a widely overlapping sliding protective glass shield (in sections if preferred) of lead-glass, slightly sand-blasted or otherwise roughened on its upper surface and sufficiently optically transparent to act as a temporary recording surface for outlining the shadows by means of a lead pencil when the screen is

lit up. This recording surface being much more extensive than the fluorescent screen permits the position of the points of the plumb-bob on it to be marked irrespective of the actual place of a perhaps small fluorescent screen, and at the same time provides some protection for the hands of the observer; the pencil marks can afterward be washed off. O, and O,, are the first and second positions of the Roentgen ray center of emission, constituting the base and parallel to the plane of the fluorescent screen, which plane is always horizontal if the surface of the table is so; x, and x,, are the two points indicated by the successive positions of the point of the plumb-bob, in which the vertical Roentgen rays cut the picture plane, constituting the base on the plate; and m, and m,, are respectively the first and second positions of the shadow of a foreign body thrown from O, and then from O,,. If on the recording surface of the shield when the light is turned on we mark the points x, and x,, and join x, with m, and x,, with m,, we get a sort of x-shaped figure; the point of intersection is the crucial point, p. If the plane of the upper deck is truly horizontal and the plumb-line correctly centered over the Roentgen ray center of emission (as can be done once for all in various ingenious ways), then we know that the center of the geometrical space occupied (but probably not completely filled) by any foreign body M is always in the vertical line P M below p. The distance p M is the depth of this "metacenter" of the foreign body below p and within the patient. By means of a free plumb-line we can now mark the point on the patient vertically below p, noticing carefully at the time the depth (if any) between the surface of the patient and the point p at the level of the upper deck. We can now dismiss the patient until he is wanted for operation. To get the depth p m plot out one or other of the triangle O x m, and mark in the position of p in some of the ordinary well-known ways. It is wise always for the radiographer to add half an inch or more to the depth p M, once he is sure of his vertical direction, when he knows he is dealing with any irregularly-shaped foreign body of any size much larger than a small shot or fragment. With an undistorted service bullet, the surgeon may be safely left to make his own correction. A good deal of the apparatus depicted can be improvised with the resources necessarily present when a Roentgen ray installation can be installed and worked. As a rule, existing practice prefers to get the point x, and m, over each other and to ignore p as a separate entity; this also can fairly easily be done by means of this apparatus. I and II indicate the first and second positions of the brackets bearing the tube box and the plumb-line.



Sommer, Ernst, Editor: Röntgen-Taschenbuch, Leipzig, 1914, vol. vi.

The sixth volume of the Röntgen Taschenbuch has just been issued. Dr. Ernst Sommer is the editor and the foremost Roentgenologists of Germany contributors. Many phases of technique and treatment are dis-

cussed in detail and a review of the literature brought up to date. A series of experiments in the use of different developers is described, from which the conclusion is drawn that the use of slow developers is to be preferred to that of rapid developers, because finer differentiations in shading can be obtained. Glycin and metol-hydroquinone are used as examples of the two kinds of developers. Attention is called to the fact that the importance of diaphragms in Roentgen photography has been much exaggerated. If used the opening should be rectangular, corresponding to the form of the plate, rather than round, as it usually is. For therapeutic purposes, however, the round compression cylinder is of great value. Dessauer and Wetterer performed a series of experiments in treating various skin conditions with hard rays, instead of the medium soft rays that have heretofore been used in such conditions. In using hard rays in such conditions it must be borne in mind that equal dosages of hard and soft rays cannot be compared, for a considerably higher dosage of the hard rays is required to produce the same effect. They found that hard rays were superior to soft rays in the treatment of hypertrichosis, parasitic hard diseases, keloid, warts, angioma, and all carcinomata, even superficial, so-called benign ones. In lupus the hard rays do not seem to offer any advantage over the medium soft ones. Holzknecht has devised a new scale for the Sabouraud tablet, designed for use at full focus-skin distance, instead of half as has formerly been used. With the higher dosage that is now used sufficient change of color is produced at this distance, and the procedure is very much simplified. The old scale can still be used by multiplying the figure found on it by 4. Kleineberger reviews the Roentgen treatment of blood diseases. One of the most interesting chapters is that by Kupferle on the effect of Roentgen rays on experimental pulmonary tuberculosis. Rabbits were infected through the ear vein with tubercle bacilli, and he found that experimental pulmonary tuberculosis produced in this way was favorably influenced by Roentgen treatment. The tuberculous proliferation tissue was destroyed and connective tissue developed in its place. This good effect was produced both in early and far advanced cases. No direct influence on the bacilli has been demonstrated, but from his experiments he concludes that the use of Roentgen rays for pulmonary tuberculosis in human beings is justified. Pförringer has had excellent results in surgical tuberculosis, both of glands and bones and joints. One hopeful point about the treatment is that it shows its best results in the open, fistulous or ulcerating cases, where the results of other forms of treatment are the most hopeless. He thinks it possible that there is, as Wilms suggests, an increased resistance to tubercular re-infection produced by the rays, a sort of auto-vaccination. There has been considerable dispute as to the technique to be used in Roentgen treatment of surgical tuberculosis; the former tendency was to use small or moderate doses with weak filtration, but there is an increasing tendency to use high doses and strong filtration. Pförringer's technique is as follows: aluminum filters 3 to 4 mm. thick; irradiation in several places; doses up to 10 H on normal skin, lower if the skin shows pathological changes; irradiation repeated after 4 weeks. In tuberculosis of the larynx the rays decrease pain and dysphagia. Sommer reviews the whole subject with a very interesting section on the intravenous injection of substances designed to supplement the biological effect of the rays by chemical action, that is to further cell disintegration. Colloid metals and arsenic preparations are the substances most frequently used, and good results have been reported. Alelekoff points out the difficulties and disadvantages of orthodiagraphy and works out a method of determining the true size of the heart, by taking two radiographs of the heart, one at half the distance of the other. The size of the two shadows and the distances in the two cases furnish two known quantities for an equation in which the unknown distance is the actual size of the heart.

The whole volume is a concise and thor-

ough recapitulation of the whole subject up to date.

Schneider, Albert: Comparative Roentgen Examinations of the Form and Position of the Stomach after Distension with Carbonic Acid and after taking a Barium Sulphate Meal, with Especial Reference to Percussion of the Distended Stomach (Vergleichende röntgenologische Untersuchungen uber Form und Lage des Magens nach Aufblähung mit Kohlensäure und nach Eingabe der Bariumsulfatmahlzeit mit besonderer Berücksichtigung der Perkussion des aufgeblähten Magens). Fortschr. a. d. Geb. d. Röntgenstrahl., 1914, xxii, 330.

Schneider found by comparative examinations that there was great difference in the Roentgen picture of the stomach after distension with carbonic acid and after a barium sulfate meal. The form of the stomach after the barium sulfate meal corresponds to natural conditions, that after distension is an artificial product. The lower boundary of the stomach can be percussed with the patient lying down; the lateral boundaries cannot be percussed. The lower boundary of the distended stomach, both in the lying and sitting position, is considerably higher than that of the stomach after a barium sulfate meal. The determination of the lower boundary of the distended stomach in the lying position either by percussion or Roentgen examination has considerable diagnostic value.

Hida: Method of Maintaining Constant Hardness of Tubes (Methode zum Erreichen einer konstanten Härte der Röhre). Fortschr. a. d. Geb. d. Röntgenstrahl., 1914, xxii, 297.

The softening of the tubes during use, even the tubes with cooled anticathodes, often leads to considerable errors in the dosage. Investigation showed that there must be some other source of heat production, and this was found to be in the wall of the globe directly opposite the anticathode. The author undertook a series of experiments to determine whether by keeping the fluorescent part of the hemisphere of the tube cool a uniform hardness could be maintained. A thermometer was fastened on the tube opposite the anticathode and the tube cooled by an electric fan placed at 50 to 60 cm. distance. The results are given in the form of a table and show that the desired result was attained. Manufacturers should give attention to constructing a tube stand that provides for good ventilation of the tube, perhaps provided with an apparatus for conducting a current of air against the hemisphere which emits the light.

Regaud, Cl. and Crémieu, R.: Experimental Basis of Roentgen Treatment of Hypertrophy of the Thymus (Die experimentellen Grundlagen der röntgentherapeutischen behandlung der Thymus hypertrophie). Strahlentherap., 1914, iv, 708.

According to previous workers, Heineke, Rudberg, Aubertin-Bardet, Picache and Beclere, Roentgen rays have an intense effect on the thymus, which manifests itself in a degeneration, especially of the lymphocytes, which may be followed by regeneration. Regaud and Cremieu have tested these results in young cats, using modern radiological technique. After the application of a dose of 14 H a reduction of the thymus was demonstrable on the second day, which on the fifth day had reached 80 per cent and by the 14th day over 90 per cent. This is due to necrobiosis and absorption of the thymus lymph nodes. The cells of the connective tissue are said to be transformed into Hassal's bodies. The regeneration begins about the 15th day in the lymphocytes that have remained intact and finally leads by karyokinesis to complete restitutio ad integrum. The thymus could be completely destroyed by one irradiation of 50 H. The general condition and the skin are not injured. From their experiments these two authors recommend Roentgen irradiation as the method of choice in the thymus hypertrophy of children, on the hypothesis that the histological structure of the hyperplastic thymus differs in no respect from that of the normal thymus. Eight cases were cured after 6 to 8 irradiations.

Treatment of hyperplasia of the thymus with attacks of stenosis: Dosage tint III Bordier, with 3 to 4 mm. aluminum filter, and 35 to 45 minutes irradiation. After about 20 days this is repeated with tint I Bordier, and a focal distance of 30 cm. Treatment of chronic cases of stenosis: Tint O Bordier every 8 days, repeated 4 or 5 times. The regression of the thymus is always controlled by radiological examinations.

Infroit, Ch.: Radiography of the Cranium. New Arrangement for Immobilizing the Head. (Note sur la radiographie cranienne. Nouveau dispositif pour immobiliser la tête). Bull. de l'acad. de méd. de Paris, 1914, lxxi, 872.

In radiography of the cranium it is absolutely essential that the head should be in such a position that the median sagittal line is parallel to the plate. In a radiograph of the leg one can make allowance for the deformity of the image, but the slightest deformity in a radiograph of the head makes interpretation impossible, and may have serious consequences for the patient. In his experiments the author fastened two rings on opposite sides of the head, placing them absolutely symmetrically over the temporal regions. The normal ray passed through the center of the rings and through the posterior clinoid processes; if the rings were superimposed in the picture it showed that there had been no deformity. Experiments in varying the position of the tube showed that a change in position of the tube did not affect the verity of the picture if the tube was 70 cm. from the plate. But if the head was inclined as much as 1 cm. in either direction there was a distance of 4 cm. between the centers of the circles, and the image of the sella turcica was markedly altered. It is very difficult to keep the head motionless, and the author has devised a means of doing so. He covers a metallic plate with dentist's wax and takes an impression of the patient's mouth. This hardens and when the picture is to be taken the impression is placed in the patient's mouth, and the plate is fixed by the aid of two screws to a very firm support that is fastened to the floor. The support, the plate and the tube carrier are placed absolutely parallel to each other. Thanks to this arrangement a perfectly accurate image of the sella turcica can be obtained.

Landau, L.: Treatment of Carcinoma of the Uterus with Radioactive Substances (Zur Behandlung des Carcinoma Uteri mittels radioaktiver Substanzen). Zentralbl. f. Gynäk., 1914, xxxviii, 399.

Landau believes that the uterus and the part of the parametrium immediately surrounding it should first be removed and Roentgen treatment given afterwards for the following reasons: (1) Metastases in the fundus may not be accessible to the effects of the rays; (2) the thick wall of the uterus weakens the rays like a filter, and (3) after the removal of the uterus deeper parts of the tissues are made accessible to the effect of the rays.

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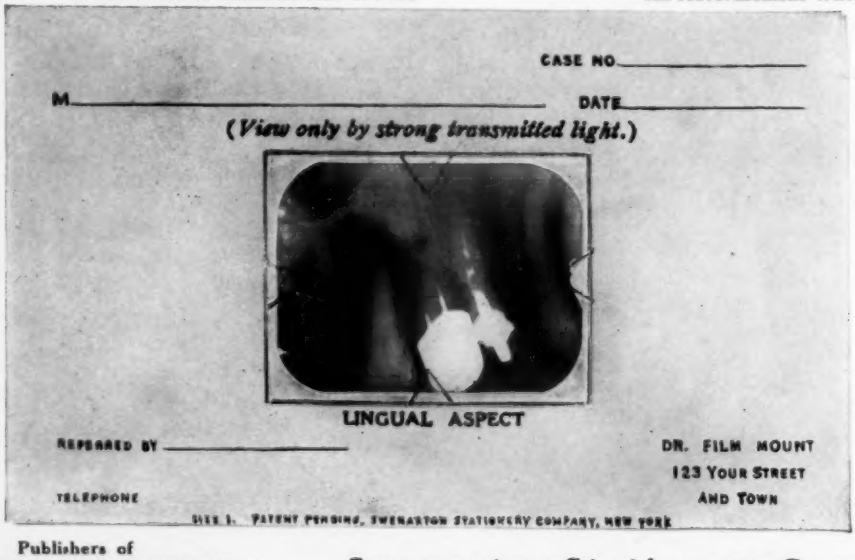

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